THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. DECEMBER 12, 1895. CHICAGO, ILL. NUMBER 50.

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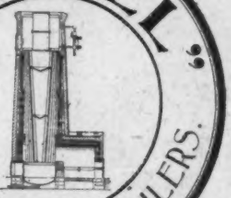
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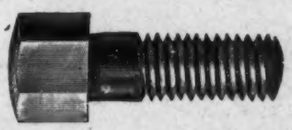
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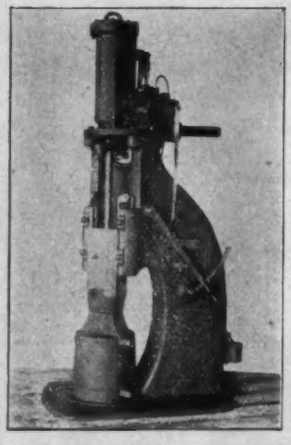

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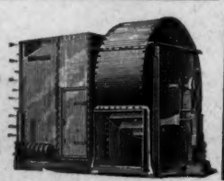

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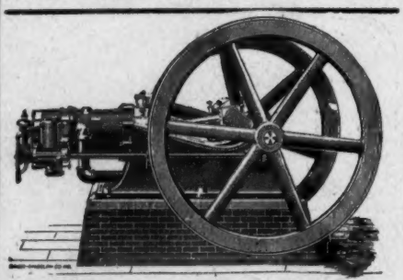

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THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. DECEMBER 12, 1895. CHICAGO, ILL. NUMBER 50.

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The Central West furnishes the most cheering news of the week. Four more big freighters have been placed at lake shipyards in the past three days, making 14 for the week, involving a demand upon the mills for about 35,000 tons of plates and shapes. As was to be expected, this business brought out some close competition and recent quotations were cut; but the important fact is that deliveries are to begin at once and the mills taking the bulk of the material will thus be better able to maintain prices in a time always marked by weakness. There is little change in the pig iron situation. All irons are weaker, Bessemer going a trifle below the $12 mark, valley furnace, in a few speculative transactions. Thus far no sales are reported by furnaces at less than $12.25 in the valley for the first quarter of 1896; but recent business on this basis would probably not exceed 10,000 tons, though on some $12 iron deliveries run through January. While actual sales of billets are limited to the 1,000 ton and 500 ton lots on which $17 Pittsburg and somewhat less has been done, inquiries are out which indicate that a few important consumers, notably in Cleveland, are convinced that the buying time is now. There are reports of low billet quotations from the West, in the Cleveland district, and accompanying denials. The fact that the market has been for so many weeks in the hands of non-producers, coupled with the comparative smallness of the tonnage involved in week-to-week transactions, has made it difficult for mills to gauge an asking price that would be in harmony with real conditions and be justified by the Bessemer pig market of the next four months. A factor that may soon be important in determining the price of Bessemer is the demand for 50 per cent higher Sunday pay by Shenango valley furnace workers, It will not be granted, and it may turn out that the workers have planned better than they intended for the furnace firms, as the situation is entirely favorable for a curtailment of output. The week has brought little that will help to solve the problem of prices in the first half of '96. The large tonnage of new boats placed has a distinct bearing on lake freights for 1896 and indirectly on the ore situation. It seems to be generally accepted that the formality of the announcement is all that stands between the furnaces and $2 Connellsville coke. The firmer feeling in Bessemer pig that would be expected from the nearness of such an advance has not been felt. As was expected, November brought a check in the reduction of pig iron stocks. Coke iron stocks gained about 26,000 tons, bringing them back to about the figure of Oct. 1—something under 198,000 tons. The November addition practically balanced the October decrease.

THE CLEVELAND DISTRICT.

There is no little surprise among ore shippers at the size of the total ore movement from the Lake Superior district in the season just closed, While there is a larger shipment of Bessemer ores than was originally counted on—about 5,000,000 tons of old-range Bessemers and 2,000,000 tons of Mesabi Bessemers—the unexpectedly high figures are due to an unforeseen demand for ores for foundry and forge irons. The production of the latter has been much more than was looked for, in view of the steady movement toward steel. The statistics would go to show that the steel mills were inadequate to the demand upon them, in the midst of the boom, and that iron was called upon to help out. This was notably the case in wrought pipe. The shipment of non-Bessemer ores is probably in the neighborhood of 3,000,000 tons. In the past week a meeting has been held, of lines carrying ore from Lake Erie ports. The object was said to be to harmonize ore rates to Ohio river points with those to the valleys, 67½c, and Pittsburg, $1.15. No change was made, however.

Pig Iron. The most important development of the week was the demand of Shenango valley furnace workers for one-and-a-half-day's pay for Sunday labor and for double pay on legal holidays. The usual 30 days notice was given. At New Castle the furnacemen answered by giving the men until next Monday to withdraw their demand. The time is the most inopportune the men could have chosen, and it may turn out that they will bring about the very condition that is desired for the health of the market, but that no deliberately attempted combination could produce. The advance, which means about five per cent additional labor cost on every ton of iron, has been uniformly refused, and it remains to be seen whether the men will go out. No demand has been made as yet in the Mahoning valley. There has been some accumulation of stocks in November, but there will be a partial counteracting of the weakness in Bessemer by the changing of two or three valley stacks to foundry and mill irons. The price has gone below $12 in the valley on speculative Bessemer, a sale of 1,000 tons being reported at $11.90 In foundry irons there is somewhat more inquiry, and the end of old contracts is at hand, but buyers are waiting until January. We hear of $13 and $13.25 sales of No. 2 in the valley, with $14 maintained by sellers, on No. 1. A sale of No. 3 was made at $12.50 valley furnace.

Finished Material. The big shipbuilding contracts have been a stimulus to plate and structural mills the past week, and some lively competition has resulted. The 14 steamers and consorts referred to elsewhere call for nearly 35,000 tons of plates and shapes, a considerable portion of which has been placed. Bay City plates, 5,000 tons, went to the Western bidder, though Pittsburg was a close competitor. On other contracts 3,000 tons of plates went to Cleveland and 2,500 tons to Pittsburg, and 1,200 tons of shapes to an Eastern mill which made a delivered price close to 1.50c. Prices on plates, beams and channels and angles, that have been well maintained locally of late, went quite to pieces in the struggle for these desirable orders. Some of the successful bids on plates are understood to have been in the neighborhood of 1.50c. There is some figuring on steel in the Cleveland market, one inquiry being for 5,000 tons. The market has gone below $17, Cleveland, and $16 50 at valley mill points is reported on speculative steel.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

The market is still in a very unsettled condition. In some branches a much better inquiry is noted while in others the demand seems to have fallen off. Prices are very much mixed also, some quotations being held to very firmly, while others are weaker and in a few cases have been made considerably lower. The demand for pig iron for delivery the balance of this year is light, but it is expected that the call for material for next year's delivery will be large unless buyers become so much frightened over the lower prices made on other classes of material as to refuse to contract for long delivery and make only contracts for their immediate needs. In bar iron, only a small business has been done and mills outside of the association have made lower figures. Demand for rails is exceedingly good considering the season of the year and it is expected that the inquiry for next year's delivery will be exceptionally large. In soft steel no business of any importance has been done. A number of inquiries have come into market for round lots of structural material and these undoubtedly will be placed soon. A large demand has sprung up from ship builders for plates for the ten vessels contracted for last week and orders will undoubtedly be placed for these plates in the present week. About 5,000 tons will be required for the three vessels contracted for by the local ship yards. In sheets the inquiry has been fair but prices are considerably lower. Two round lots of old material were sold, but aside from this, business was dull.

PIG IRON.—The demand for iron for delivery this year continues to be of small proportions and only one or two sales as large as 500 tons were made. These were all for Southern iron. One sale of Southern charcoal, 500 tons, was made to a local car-builder, for wheels. The inquiry for local iron is small and current buying very light. It is believed that the tonnage for January will be large, as nearly all buyers are now working on a hand-to-mouth basis and postponing buying as far as possible. It will be necessary for them to make large purchases to meet their requirements for the first half of next year and it is probable that these purchases will be made in January. On local irons quotations are being maintained, but considerable cutting has been done on Southern iron, although the two largest companies in the Birmirgham district are maintaining prices firmly. Cuts have been made by some of the smaller furnace companies of 25c and 50c a ton. Lake Superior charcoal continues in good demand and a number of fair sized orders were placed last week. Quotations are made as follows:

Lake Sup. Charcoal	$15 50@16 00	Southern No. 2 Soft	$ @13 85
Local Coke Fdy. No. 1	15 00@15 50	South'n Silveries No. 1	@15 00
Local Coke Fdy. No. 2	14 50@15 00	South'n Silveries No. 2	@14 50
Local Coke Fdy. No. 3	14 00@14 50	Jackson Co. Silveries	15 50@16 00
Local Scotch Fdy. No. 1	15 00@15 50	Ohio Silveries No. 1	15 00@15 50
Local Scotch Fdy. No. 2	14 50@15 00	Ohio Silveries No. 2	14 50@15 00
Local Scotch Fdy. No. 3	14 00@14 50	Ohio Strong Softeners	15 00@15 50
South'n Coke No. 2	@13 85	Alabama Car Wheel	17 00@17 50
South'n Coke No. 3	@13 60	Malleable Bessemer	
Southern No. 1 Soft	@14 10	Coke Bessemer	

BARS.—The car works in this district have apparently filled all their requirements, as they made no purchases of any size last week. General business has been quiet and it is not expected it will be much better before the first of the year, after the consumers have finished taking stock. Quotations are made at 1.50c for common iron and 1.60c for guaranteed. Soft steel bars have been sold at a price considerably under that of common iron, and it is reported that mills outside of the association have cut its prices on iron to some extent. It is not thought, however, that any association mills have participated in the cutting.

RAILS AND TRACK SUPPLIES.—The Sales of rails are keeping up exceedingly well, and the tonnage placed last week was large, considering the season of the year. So far only a few inquiries have been received for delivery next year and no sales have been made, but it is expected that business of this character will commence within a very short time. It is predicted that the requirements for next year will be of good proportions. Quotations are as follows: Rails, $29 and up; splice bars, 1.65c to 1.75c; track bolts, 2.25c to 2.45c; spikes, 1.95c to 2c.

BILLETS AND RODS.—The local mills did no business of any consequence last week, and do not expect any very large demand for soft steel until after consumers have finished taking stock. In the absence of sales no quotations are made.

STRUCTURAL MATERIAL.—The Union Loop Co. has asked for bids on 1,200 tons of material for its Wabash avenue extension, and the order for this will probably be placed this week. The Wisconsin Central placed an order with an Eastern mill for a little less than 1,000 tons of material for bridge work. An order will probably be given out this week for about 500 tons for the Coliseum rebuilding. Aside from these, business has been quiet. Prices are lower, and those on angles and plates are weak. Beams and channels, 1.85c to 1.90c; angles, 1.60c to 1.65c; plates, 1.65c to 1.70c; tees, 1.85c to 1.90c. Small lots from stock are quoted ¼c to ½c higher.

PLATES.—A large inquiry has resulted for ship plates as a consequence of the placing of orders for ten vessels last week, and about 5,000 tons of plates will be required for the three vessels contracted for by the local shipbuilding company. It is probable that a large share of the total tonnage required for the ten vessels will be taken by the local mills. Quotations are made as follows: Tank steel, 1.65c to 1.75c; flange steel, 1.95c to 2.05c; firebox steel, 2.85c to 5c; boiler tubes, 60 to 65 per cent discount.

MERCHANT STEEL.—The inquiry has been a good deal better, and a number of good orders were placed last week. Quotations are as follows: Open hearth spring, tire and machinery steel, 2.20c to 2.25c; smooth finished machinery steel, 1.95c to 2c; smooth finished tire, 1.90c to 1.95c; tool steel, 5.50c to 7.50c; specials, 11c and upwards; Bessemer bars, 1.55c to 1.65c.

SHEETS.—The demand for black sheets is good, and several fair sized orders have been given out lately. The market is very weak, and the local mills quote 2.45c to 2.50c for No. 27 common. Eastern mills, however, refuse to meet these figures. Galvanized iron is quiet, with no large orders placed, and is weaker. Western mills quote 75 and 10 and 5 per cent discount for mill lots, but Eastern mills go no lower than 75 and 10.

OLD RAILS AND WHEELS.—A sale of 500 tons of old wheels was made last week, at $14. Aside from this, inquiry was fair but no large sales were made. Old iron rails are quiet and nominal at $16 and old steel rails $11 to $12, according to length, etc.

SCRAP.—The market has been quiet, the only important sale being one of 500 tons of cast at $10.45 per net ton. Stocks in dealers' hands are much lighter than they were at this time last year, and if there should be a heavy demand after the first of the year it seems quite possible that a shortage of material might result. At present, however, the supply is fully equal to the demand. The following are buying quotations furnished by dealers: Railroad forge, $11.50; dealer's forge, $10; No. 1 mill, $7.50; railroad cast, gross ton, $10; machinery cast, $11;

axles, $14; cast borings, $5; wrought turnings, $6; axle turnings, $7; mixed steel, $8; stoveplates, $6 to $6.50; heavy melting steel, $10.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. Bessemer pig and steel are slightly weaker, if at all changed from last week. Sales by middlemen for December delivery have shaded $12 at valley furnace in one or two instances; 1,500 tons being reported at $11.85. Two sales of 2,000 tons each were made at $12 in the valley. Little further is doing for the first quarter, partly in view of the certainty that coke will be much higher and furnacemen do not find $12.25 in the valley attractive, with an increased coke cost of from 60 to 70 cents a ton. The last 1896 sale reported was at $13 Pittsburg, deliveries in January, February and March. The ore price is a subject of speculation but there is nothing more definite than rumor, and it is certain the leading sellers and the leading buyers of ore have not come together in any serious discussion of the question. Foundry irons have settled somewhat, and buyers are postponing new contracts. We quote $14.25 for No. 1 and $13.50 for No. 2. Valley gray forge has sold at $12.25 and $12.50 delivered here and some Southern forge has come in at a figure much below this basis. There appears to be more steel that must be placed in December, and $17 to $17.25 is the range of the small-lot transactions in this market, though reports of lower prices come from outside districts, notably Cleveland. The most important business for the mills comes from the recent shipyard orders placed at Cleveland. Local mills have a portion of this, though it is reported a considerable tonnage went to the Chicago district. The quotation of 1.55c to 1.60c Pittsburg on tank steel has been cut in connection with recent business. On angles 1.50c has been shaded. Steel bars are quoted 1.25c to 1.30c and it is believed some business has been diverted from iron mills because of the considerable difference now existing between steel quotations and bar iron association prices. There is some inquiry for sheet bars, but quotations vary. The range is from $20.50 to $21.50. No sales of wire rods are reported and considerable stocks are in makers' hands. In sheets some mills are naming low prices. For No. 27 steel sheets we quote 2.40c. Galvanized are 75 and 10 per cent off. In skelp iron and in wrought pipe and tubes, low prices are being made, with demand fair. There is a shortening of operations among most of the mills and shut-downs in various departments are expected in the next fortnight. The coke price for 1896 has not been announced, but there is no expectation that anything but the $2 figure will be named in the circular, and that so far as the leading interest is concerned the circular price will be the price furnacemen will pay. There is some irregularity in shipments from the Connellsville region. For the week ending Nov. 30, the aggregate was 9,294 cars, a decrease of 80 cars from the preceding week. There were 16,111 active and 1,836 idle ovens in the same week and the estimated production 164,285 tons, a decrease of 4,460 tons from the preceding week.

Cincinnati. Considerable business has been done during the week, though principally in small lots and carloads. An unusual amount of figuring has been going on among buyers, almost persuaded that now is a favored time in which to contract for future wants, and many of these negotiations have developed into orders, though at prices under those of 10 days ago. But the large majority have little confidence in the market, and have decided to await developments. The general market is heavy and irregular in consequence, a fact patent to all interested. Pessemists and bears think prosperity cannot get here at all, but pig iron makers claim that some panaceas are near at hand in the form of Congressional relief and very low stocks of raw iron, both at furnace and at the yards of consumers. There are indications that the concessions made by some of the Southern furnaces in the past fortnight will not be repeated in the near future. The principal makers in the Alabama district have reaffirmed their schedule of Aug. 30, and owing to their very meagre stocks, purpose maintaining it. The month of December may continue the history of its first week, though a larger buying will in all probability mark the latter part of the month.

Buffalo. The pig iron market in this section continues to show a quiet surface, although it is evident it is being watched with much interest by both buyers and sellers. The fluctuation of Bessemer pig has some influence on prices of foundry iron. This, coupled with some desirable contracts which have been up this past week, developed some bidding which shaded local prices for current business. We revise our figures to the basis of $14.50 for No 1 strong foundry, and $14 for No. 2.

Western Foundrymen's Association.

The next meeting of the Western Foundrymen's Association will take place at the Great Northern Hotel, Chicago, at 7:30 P. M. Wednesday, Dec. 18. A paper will be read by Mr. P. S. Dingey, member A. S. M. E., entitled, "The Care of Patterns and Pattern Account." The report of the committee on by-laws, presented at the last meeting, will be discussed, and new by-laws adopted. A buffet lunch will be served after the meeting. Members who have questions relating to foundry practice which they would like to have discussed are asked to send them to the secretary, S. T. Johnston, 1522 Monadnock Block, a few days before the meeting.

A RECENT incorporation is the American Board of Mining Industries, at Chicago; without capital stock; general interests in mining, developing mining property and machinery, afford facilities for sale of stocks and securities, adjust business disputes; incorporators, Charles F. Williams, John Russell Jones, and William A. Ball, who are also directors; George P. Townsend, John D. Hall, Edward A. Harding, Robert Linn, Thomas J. Oliver, J. W. Barney. This is one of a number of mining exchanges which have been promoted at Chicago lately, in furtherance of the idea that there should be an exchange in that city to deal in mines and mining securities. It it very probable that within a short time some one of the various plans proposed will be carried through. At present there is no mining exchange in Chicago, the Board of Governors of the Stock Exchange having recently voted down a proposition to list mining securities.

The Whiting Foundry Equipment Co., of Chicago, reports having made recent shipments of the Whiting cupola as follows: One test cupola to University of Illinois, Champaign, Ill.; one 14-ton per hour cupola, Globe Iron Works, Cleveland; five-ton cupolas to Hazleton Iron Works, Hazleton, Pa.; Cornish, Curtis & Greene, Ft. Atkinson, Wis.; J. M. Saville & Sons, Canton, Ill.; one 12-ton per hour cupola to Ames Iron Works, Oswego, N. Y. The same company has recently shipped two 20-ton and two 15-ton ladles to plants connected with the American Steel Casting Co., of Alliance and Pittsburg. Trade is very good and the company's plant is working to its full capacity.

A CABLEGRAM just received by the Bethlehem Iron Co. reports successful tests of side armor plate for the battleship Sevastapol, resulting in the acceptance of 550 tons. The penetrations were very slight and there were no cracks.

THE IRON TRADE REVIEW

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DECEMBER 12, 1895.

FOURTEEN NEW LAKE VESSELS PLACED.

Contracts have been closed in Cleveland in the past eight days for 14 steel freight vessels—eight steamers and six tow barges. Twelve are for John D. Rockefeller and will be employed in carrying ore from the Rockefeller or Lake Superior Consolidated properties on the Mesabi range; two are for the Minnesota Steamship Co. All were placed through Pickands, Mather & Co., Cleveland, who are a connected interest of the Minnesota Steamship Co., and for the past year have managed the whaleback fleet of the American Steel Barge Co., in which Mr. Rockefeller's interest is large.

The new steamers will be 404 to 418 feet keel and the tow barges 350 to 376 feet keel. The contracts are distributed among six ship-building concerns. The Chicago Shipbuilding Co. gets one steamer and three barges. Two of the latter, let this week, will be 352 feet keel, 44 feet beam and 26 feet deep. The American Steel Barge Co., of West Superior, will build one steamer and one barge, both whalebacks. One steamer goes to the Cleveland Shipbuilding Co. and two steamers to the Globe Iron Works Co., Cleveland. F. W. Wheeler & Co., West Bay City, Mich., will build one steamer and two consorts. The two boats which are to be built for the Minnesota Steamship Co. are in addition to the two now under construction for that company at South Chicago. Two of the Rockefeller steamers were placed, on Wednesday, with the Detroit Dry Dock Co. Each will be 418 feet keel and 45½ feet beam.

The above contracts make 44 vessels now under contract at lake shipyards, all to be delivered within the coming year, and most of them early in the navigation season. They represent an aggregate value of over $7,500,000 and mean a large tonnage of plates and shapes for the mills of the Central West and the Chicago district. The Rockefeller vessels represent an aggregate value of close to $3,000,000. All the 14 vessels placed in the past week are designed to carry 4,000 tons each on 14 feet six inches draught.

The placing of the contracts was completed without the bidders knowing for what interest the vessels were ordered. It was the understanding of all the shipbuilding companies that only two boats were to be built and each bidder, anxious to get the work, made a closely competitive price. When the awards were finally made and every yard had from one to three vessels, the surprise may be imagined.

JEFFERSON D. DAY, superintendent of the Norrie group of mines, whose serious illness was noted in these columns last week, died of Bright's disease at Lake Linden, Mich., on Dec. 5, aged 55 years. He had been connected with Lake Superior iron mining for 25 years and was one of the best known iron men in the region.

10,233,910 TONS OF ORE.

HEAVY SHIPMENTS FROM LAKE SUPERIOR.

Nearly 1,700,000 Tons in Excess of the Greatest Water Movement in any Other Season—Lake Erie Receipts 8,112,228 Tons, with 4,415,712 Tons on Dock.

The season of 1895 will be remembered as one that not only exceeded all records in the amount of iron ore shipped from Lake Superior mines, but as one that went far beyond the estimates of those in closest touch with the ore trade. The completed figures furnished direct to *The Iron Trade Review*, from all Lake Superior and Lake Michigan ore-shipping docks, show that the enormous total of 10,233,910 gross tons passed over these docks into vessels in the season just closing. It has been a year of surprises, both as to the demand for ore and the prices reached in mid-season sales, and as to the altitude attained by lake freights. The estimate of 8,000,000 tons, as a maximum output, made early in the season by ore shippers could not take account of a boom in iron which no one then dreamed of; nor could the producers of Bessemer ores, who carefully and conservatively set to work last winter to prevent a repetition of the ruinous prices of 1894, have foreseen that before the summer closed standard Gogebic Bessemers would go to $4.25 and $4.40, and hard Bessemers to $5. And there was no optimist among the vessel interest, who expected that with 75-cent and 80-cent season charters on ore at the beginning, $1.75 would actually be paid before the season ended, on shipments from Duluth.

LAKE ERIE RECEIPTS, 8,112,228 TONS.

While Dec. 1 is the date usually counted for the end of the shipping season, some cargoes of ore were as late as Dec. 7 in leaving Escanaba and it was Dec. 11 before the last ore had been put on Lake Erie dock. The figures given below showing receipts at Lake Erie ports include all the ore brought down; and in the case of stocks on dock, while the usual date, Dec. 1, is retained, the statistics include stocks remaining when the last cargo was unloaded. The aggregates appear thus:

Receipts at Lake Erie ports, season of 1895, ... 8,112,228 tons.
On dock at Lake Erie ports, Dec. 1, 1895,..... 4,415,712 tons.

As shown by our figures of May 1, 1895, there were on dock at lower lake ports at the opening of navigation this year, 2,642,980 gross tons. The shipments to furnaces in the seven months from May 1 to Dec. 1, together with the consumption by furnaces at Tonawanda, Buffalo and Cleveland receiving ore direct into their yards from vessels, have thus been 6,339,496 gross tons, against 4,104,948 tons in the same period last year, 3,358,148 tons in 1893 and 4,048,471 tons in the prosperous year 1892. The table below gives in the last column the receipts at all ports in the season just closed, and for purposes of comparison the receipts for the preceding five years are also shown:

IRON ORE RECEIPTS AT LAKE ERIE PORTS, GROSS TONS

Ports.	1890.	1891.	1892.	1893.	1894.	1895.
Toledo	164,595	191,105	139,987	145,515	158,384	260,730
Sandusky	174,596	106,907	49,736	4,464	23,043	12,361
Huron	1,200	14,910	65,000	137,700	172,775	146,442
Lorain	280,450	266,009	190,400	165,667	150,424	214,219
Cleveland	1,945,492	1,257,775	1,950,224	1,260,716	1,624,573	2,312,370
Fairport	1,096,408	699,434	866,611	792,517	976,222	914,617
Ashtabula	2,176,730	1,599,785	2,555,416	1,845,738	1,987,722	2,474,791
Conneaut			1,130	203,227	237 905	244,967
Erie	487,493	393,759	645,230	469,299	621,438	811,989
Buffalo* / Tonawanda	548,000	410,000	197,000	368 238	395,339	719,742
Total	6,874,664	4 939 684	6,660,734	5 333,061	6,350,825	8,112,228

* Buffalo alone to 1893.

The subjoined table gives the amount now on dock at the various ports:

IRON ORE ON LAKE ERIE DOCKS, DEC. 1, GROSS TONS.

Ports.	1890.	1891.	1892.	1893.	1894.	1895.
Toledo	110,740	122,515	71,409	92,911	96,157	113,132
Sandusky	115,000	122,000	87,500	78,439	77,004	34,375
Huron	1,200	14,910	45,000	89,000	147,632	101,600
Lorain	210,237	250,812	147,600	201,632	223,733	224,264
Cleveland	1,209,467	1,114,762	1,347,992	1,163,930	1,441,785	1,200,792
Fairport	721,000	597,617	610,609	578,033	660,980	605,470
Ashtabula	1,151,397	993,957	1,312,658	1,296,431	1,439,119	1,301,302
Conneaut	.....	.....	.....	91,337	199,365	292,462
Erie	248,714	252,916	401,683	359,827	454,233	335,718
Buffalo / Tonawanda	125,732	129,000	125,000	119,170	94,239	207,199
Total	3,893,487	3,508,489	4,149,451	4,070,710	4,834,247	4,415,712

It will be noticed that in spite of the enormous receipts, and the heavy stocks on dock last spring, the amount remaining Dec. 1 is considerably less than on the same date last year. It is safe to say that the unsold proportion of dock stocks to-day is smaller than in several years, so thoroughly have Bessemer ores been taken up, while the inroad on non Bessemers the past season is a matter of familiar history. A large amount of what is reported is on docks owned by furnace companies, and is as though it were in the furnace yard. Considerable stock on railroad docks, too, has been contracted for and only awaits transportation to the furnace. The spring of 1896 is expected to show small dock piles unless some unforeseen interruption of furnace operations intervenes.

The relative positions of the ports as ore receiving points remain unchanged. Ashtabula leads, as heretofore, but Cleveland is closer than at any time since the lead passed from it. With unprecedented receipts at both, there was but 160,000 tons between them this season. A fact worth noting is the large amount of ore that went to Erie and Buffalo. Much of this was for Eastern shipment and it is known that the total bought by Eastern furnaces this year is the largest since the Lake Superior mines were opened.

SHIPMENTS FROM UPPER-LAKE PORTS.

It is interesting to note, in the following table, the changes in the positions of the upper lake ports from those of last year. Escanaba, which had first place for a number of years and lost it last year to Ashland, comes to the top of the list again. Ashland is second this year and Two Harbors, with the help of the Minnesota Iron Co.'s Mesabi shipments, is a strong third, gaining over 700,000 tons on its record of 1894. The table shows the water shipments from each port for 1895, and the five years preceding:

LAKE SHIPMENTS OF IRON ORE, GROSS TONS.

	1895.	1894.	1893.	1892.	1891.	1890.
Escanaba	2,860,172	1,644,770	2,048,981	4,010,085	3,058,590	3,714,662
Marquette	1,079,485	1,424,856	1,086,934	1,026,338	1,056,027	1,307,395
Ashland	2,350,219	1,738,590	1,117,520	2,223,083	1,261,658	2,123,556
Two Harbors	2,118,156	1,373,253	903,329	1,165,076	890,299	826,063
Gladstone	109,211	79,108	203,585	115,886	177,866	91,091
Superior	117,884	1,369,252	80,273	4,245	.....	.....
Duluth	1,598,783	.....	440,292	.....	.....	.....
Total by lake	10,233,910	7,629,829	5,880,918	8,545,313	6,444,440	8,063,067
Total all rail	.....	118,293	178,037	528,930	650,541	940,634
Total shipments	.....	7,748,122	6,058,955	9,074,243	7,094,981	9,003,701

Deducting from the total, 10,233,910 tons, the amount received at Lake Erie ports, the balance represents ore shipped to the Illinois Steel Co.'s docks at South Chicago, North Chicago and Bay View, and to the Calumet Furnace Co.'s docks, in addition to shipments to such of the Lake Superior charcoal furnaces as can be reached by water. The total to the Chicago district and to Bay View is 1,863,781 gross tons. Adding this to the receipts at Lake Erie ports, 8,112,228 tons, and subtracting from the upper lake shipments, gives 377,901 tons as the total shipments to charcoal furnaces.

What all-rail shipments are to be added to 10,233,910 tons to get the total shipment from Lake Superior mines in 1895 will not be known until after the close of the year. These may be sufficient to bring the aggregate to a round ten-and-a-half millions.

OUTPUT OF LEADING MINES.

While the 1895 output of the various mines in the Lake Superior region will not be known accurately until after Jan. 1, when the all-rail shipments in the twelve-month will be added to those by water, approximate figures can be given now in the case of several and an exact statement for some that will have no all-rail ore. We append the total for a few of the largest producers:

	TONS.
Norrie 620,000 / East Norrie 85,000 / Pabst 200,000	905,000
Chandler	603,000
Minnesota	435,000
Chapin	625,000
Tilden	410,000
Aurora	235,000
Lake Angeline	310,000
Cleveland	300,000
Iron Cliffs	200,000
Oliver and Lone Jack	500,377
Mountain Iron 305,000 / Rathbun 65,000	370,000
Biwabik	247,069
Franklin	286,423
Auburn	374,208
Canton	359,020
Lake Superior	324,000
Champion	100,400
Republic	173,000
Pewabic	255,000
Penn Iron Mining Co.	300,000

Shipments of the Various Ranges.

While it is impossible to give accurate figures as yet, the following will be found to be a close approximation of the shipments by water from the various ranges:

	TONS.		TONS.
Mesabi	2,760,000	Menominee	1,885,000
Gogebic	2,500,000	Vermilion	1,085,000
Marquette	2,005,000		

AFTER electing officers, as given last week, the National Bar Iron Association chose the following committee at its meeting in Pittsburg, Dec. 4: Jas. G. Caldwell, Louisville, Ky., chairman; H. T. Wallace, Wilmington, Del.; J. S. Elverson, Catasauqua, Pa.; C. C. Kauffman, Columbia, Pa.; C. N. Schmick, Leetonia, O.; W. B. Ridgley, Springfield, Ill.; W. E. Taylor, Youngstown, O.; H. A. Fuller, Cleveland; Col. F. A. Mysenberg, St. Louis. The executive committee, pending the January meeting, on the third Tuesday, will secure as many signers as possible to the agreement to form a national association. The chief thing aimed at is a uniform card of extras. The proposal to fix delivered prices of bar iron for various points all over the country has been abandoned.

THE Carnegie Steel Co., Ltd., has purchased 74 acres of river frontage, nearly a mile in length, between Homestead and Duquesne. The purpose to which the land will be put is not announced as yet. President Leishman is quoted to the effect that as some of the land is low-lying, it will be used for the present as a dumping ground for slag. The company has a charter for a bridge across the Monongahela River connecting the Homestead and Duquesne works with the Braddock furnace plant, and this project may develop.

STEEL casting companies made progress at their Pittsburg meeting last week toward an agreement to maintain a 4-cent basis on heavy work.

SEGREGATION AT FURNACE AND FOUNDRY.*

BY THOS. D. WEST.

The uneven distribution of silicon, sulphur and other metalloids in pig metal is largely due to conditions over which furnace managers have little control, while with castings, the molder or founder can, at will or through methods in casting, give rise to a diffusion or segregation of the metalloids that could often be prevented were he only aware of the elements which effect such resnlts in castings.

The molder when turning out a casting having hard or soft spots often finds the word "segregation" very convenient to diguise evil effects of hard ramming, wet sands or ill-vented molds. When a mold has been properly made and the iron well mixed and melted hot, and poured as it should be, there is generally little to fear in a practical way from segregation in castings, that can be charged to the iron or to the mixture, aside from what effects degrees in cooling or casting in a chill can have in causing different proportions of combined or graphitic carbon.

Iron melted or poured dull is much more effective in causing segregation or stratification in castings than when the reverse conditions prevail. A rammer should never be allowed to hit a pattern, as this causes a hard spot to form on the side of a mold, which for light castings changes the char cter of the iron at that spot. And the same is to be said where the swab or ill "tempered" sand caused one spot or portion of the mold to be different from another, or the venting is inadequate to the free escape of gas or steam; and again, when pouring may not be steady enough to prevent "cold-shuts," etc. Hard grades of iron are more liable to segregate than soft grades; especially so where the former is melted or poured dull. Light castings are also much more liable to segregate or stratify as to combined or graphitic carbon, than heavy castings. The above statements also give additional reasons why test bars as small as ½" square or round or any having corners are not advisable to be adopted as standards.

Diffusion, segregation or stratification of the metalloids is much more generally confined to pig metal than to castings. By remelting pig iron, we effect a mixing process, in which the chemical constituents of the castings will be uniform unless they are distorted by means of dull iron, hard ramming, wet sands, ill venting or "chills," as above stated. The elements most liable to segregate are the carbons, silicon and sulphur. Chiefly with the first named lie most all the phenomena which effect segregation in castings and which are defined simply by one part being higher in graphitic or combined carbon than another. Some have claimed the existence of "sulphur spots" in castings. With iron melted or poured dull, these may exist, but with the reverse conditions the writer has reason to believe from analyses which he has conducted to experiment with castings in this line, that sulphur will be most generally found uniformly distributed throughout a casting that has not been "chilled."

In the casting of pig metal, we often find a segregation of the metalloids rarely if ever found to exist in remelted iron which has been poured into sand molds. One peculiarity in this respect lies in the difference often found in pig metal having its uppermost cast face containing the highest sulphur, as shown by the following four samples which the writer secured for this paper by the kindness of the chemist, Mr. MacShiras, of Niles, O.:

Segregation of Sulphur in Pig Iron.

	No. 1.	No. 2	No. 3.	No. 4.
Top	.117	.115	.084	.055
Bottom	.083	.094	.170	.047

The above analysis would show that "direct metal" or iron coming from a blast furnace tends to favor the escape of sulphur, but that owing to the top surface of the pig chilling so as to form a crust at an early stage of the solidification of the metal in the pig beds, the sulphur in rising to escape was caught and hence the higher sulphur found in the top body of the pig as shown.

Silicon is also found to segregate in pig metal. Wherever pig iron shows soft gray spots, analysis will generally show these to be higher in silicon than the surrounding metal. Then again, it has been found that the first metal from a furnace is generally lower in silicon than that which flows afterward, in a manner often so uniform as to show that there is a gradual increase of silicon in the metal from the bottom upward as it lies in a furnace before being tapped.

Variations in the working of a furnace make a radical difference in diffusion of the metalloids, especially the silicon, as can be seen by the following analyses which the writer has also secured for this paper through the courtesy of Mr. C. C. Jones, an able, experienced furnace manager, operating two furnaces at Sharpsville, Pa. The pig beds are numbered in the following table according as they were cast, No. 1, being that farthest from the furnace, receiving the first iron and No. 6 the last:

Analyses of Pig Beds in a Changeable Furnace.

	1	2	3	4	5	6
Silicon	.60	.68	.70	1.00	1.25	2.20
Sulphur	.084	.071	.062	.050	.042	.027
With the furnace normal the result was as follows:						
Silicon	2.18	2 18	2.22	2.23	2 25	2.25
Sulphur	.021	.021	.020	.019	.019	.019

The above analyses of the normal woring of a furnace present the best uniform distribution of silicon and sulphur which has come under the writer's notice. As this is a question of no little importance to the founder, attention is called to the following table No. 3, showing the analyses of eight (8) different "casts" giving the silicon contents from the bottom upward, subscribed by Mr. H. Rubricius in *Chemiken Zeitung* and the *Journal of the Iron and Steel Institute No. 2, 1894*:

Silicon Analyses of Eight Casts.

Test of pig iron.	1st bed.	2d bed.	3d bed.	4th bed.	5th bed.	6th bed.	7th bed
1 cast	1 13	1.15	1.15	1.19	1.33	1.40	1.42
2 cast	1.38	1.44	1.45	1.60	1.63	1.72	1 79
3 cast	1.15	1.34	1.43	1 57	2 17	2 18	2.20
4 cast	1. 9	1 50	1 54	1.66	1.82	1.84	1.88
5 cast	1.95	2.09	2.13	2.45	2.70	2 72	2.76
6 cast	1 81	1 83	1.84	1.86	1.89	2.16	2.20
7 cast	2 72	2.74	2.77	2 79	2 85	2.88	2.89
8 cast	2.46	2.48	2.50	2.53	2.54	2.58	2.60

The above exhibits treat only of silicon and sulphur. With regard to the segregation, etc., of phosphorus and manganese, the only experiments which the writer has observed are those by Mr. A. P. Bjerregaard, commented upon in the *Iron Age*, Nov. 30, 1895. He states his conclusions as follows: "There is often a slight variation in the amount of phosphorus and manganese in the different grades formed in the same cast, but so far, no regular occurring progression variation has been observed. At best, the difference is only a few hundredths of 1 per cent."

When the founder considers that a difference of ¼ of one per cent in silicon and a few hundredths of one per cent in sulphur will seriously alter the grade of his mixture so as to either make his "cast" too soft or too hard and may often cause him great trouble or loss in the castings produced, he should at once perceive that the eneven distribution of silicon and sulphur which occurs more or less in every "cast" of a furnace is a quality seriously affecting his interests. Especially is this so, when he is aware that the one analysis which may be given is simply an average of the whole, generally taken from the two ends and middle of a "cast," and that a car of iron may come to him from a "cast," having one portion from ½ to one per cent higher in silicon than another.

Mr. Rubricius' table shows that the two ends of a "cast" may vary the whole of one per cent in silicon. In the comments which he makes on the subject, he says, in effect, that he found such a great difference to exist in the silicon contents of a "cast" that he decided it was not due to errors in analysis, but to an actual variation in the composition of the pig metal at different parts of the pig beds and that his conclusions were fully confirmed by numerous experiments which he had made to prove their correctness. Mr. Rubricius also affirms that "notwithstanding the large number of experiments made, it was not possible to correlate the initial percentage of silicon and the rate of increase, as iron poor in silicon presents, in some cases, a large increase in silicon in the upper parts. This can only be due to the difference in specific gravity between silicon and iron."

All those who have adopted or recognized chemistry during the past year or two of advancement in founding, have still another step higher to take and that now lies in attaining methods to insure the founder against the evils which come from the present system of accepting one analysis to include a whole "cast." The writer is supported by a large experience with accepting such analyses, in affirming that trouble

*Read before the Foundrymen's Association, Philadelphia, Dec. 4, 1895.

and losses are sure to follow from the present practice in this line, and that it behooves both the furnaceman and the founder to put their heads together to assist each other in devising and directing methods to eliminate these evils.

It is time attention was being given to this subject and an effort made in taking out a furnace cast to pile it or load it on cars in a way that will insure a thorough mixing of the metal so that any part will approximate the one analysis given, when the founder uses the iron. The writer would suggest that it is now in order for furnacemen to advance any system which they think best to secure a thorough mixing of a furnace's "cast," so that when the founder accepts one analysis for a car of iron he will not find that some of his "heats" or parts of them give him trouble or produce a grade of iron in his casting wholly different from that which his analysis should have secured to him or that he had correctly figured were to be expected from the mixtures which he had designed.

As we are now in our foundry melting daily from 50 to 70 tons of iron out of one cupola alone, and certain special analyses are exacted in the castings produced, we are compelled to take every precaution to insure desired results. A loss of 60 tons of castings per "heat" is something few founders would care to maintain many days. Our first practice with this work was to separate the pig metal in distinct piles on the staging, according to variation in percentage of silicon and sulphur, as recorded by the furnace analyses. When charging the iron, directions were given as to the amount of each pile was to be taken at a time, in order to obtain the average desired. We will suppose an average of 1.90 in silicon was desired and the only iron we could obtain was some 2.20 and 1.60. These respective grades would be piled independently at different parts of the cupola staging and when charging, one-half from each would be thrown into the cupola and as evenly distributed as was possible.

Many will agree that this is an excellent plan to assure complete success and the writer thought so at one time, but experience has shown him there are times when this practice leaves a gap for errors. The chances of mistake include the engagment of new men, old ones getting sick or drunk, hot weather playing men out so as to make them neglectful or to use bad judgment in sorting or placing the iron in its proper place on the staging when piling it previous to charging. The writer is well aware some would desire to come in with red tape rules and claim that good managment would insure a proper distribution or mixing of the iron in the cupola after the plan above described. Without entering into any argument on this point, suffice it to say, that experience has suggested that wherever any details of founding can be governed by positive mechanical methods of working, that should have the preference every time. For this reason I have lately adopted the following plan as an improvement upon the first, and I am pleased to say it is working very successfully:

In the delivery of pig metal to the stage, wherever two or more distinct grades must be used to obtain the average desired, we now insist upon each varying grade coming to the stage at the same time, on independent buggies and then instead of piling each grade separately as was formerly done, they are mixed pig about, in the same pile of one ton each, so that when charging time comes, there are no high and low distinct iron piles which must be carefully guarded in order that no more of one than the other, as desired, goes into the cupola; but it allows any pile to be used and if the men then try to make blunders, ill-mix the iron, or have the high silicon on one side and the low on the other of the cupola, as was easily done in the former case, they could not do so.

This latter plan involves no more labor in piling the iron on a cupola stage than the former one and I know from experience that it is far superior in giving a uniform product in the the castings.

The question may be asked: "If we were to receive one portion of our iron ½% higher in silicon and .04 in sulphur than the analysis calls for, how is any system of piling it on a cupola staging going to remedy the lack of a thorough mixing of a furnace cast?" The only reply the writer has is that he is not responsible for the furnace end of it, but believes he has pointed out a line of action to improve furnace methods in piling and shipping iron, and has faith that all following the second method described for the foundry end of the work will find it a decided improvement.

In dull times, when the founder has little use for pig iron and the furnace yards are full and new counties are sought for, to pile it up for delivery in a 'boom" time, the founder can readily get the percentage of silicon and sulphur in one grade of iron which he may want to make the castings desired. It is when a "boom" is well on and the founder has got good use for pig iron, that he often finds difficulty in getting just what he should have and by the scarcity of desired iron, often experiences trouble and losses in trying to patch up mixtures. For example, a founder might desire to secure a 2.25 per cent silicon iron but could only obtain for immediate use a much higher and lower silicon iron, which he would be compelled to average up or mix the best he could to obtain castings the grade desired.

A point that may well be raised is what divergence in the extremes of silicon percentages is permissible without producing ill results. Some have gone so far as to use and advise the practice of mixing ferro-silicon or pig iron containing from 7 to 14 per cant of silicon with "white" iron to obtain good grades of gray iron castings. The writer is not an advocate of blending such extremes wherever it is possible to avoid the practice. Ten chances to one, more moderate measures will give more uniform results, throughout a "heat" and the longer the heats are the greater the necessity for avoiding extremes in the silicon, etc., of the irons making a mixture. It is not practical to be too exacting in this line, owing to the fact that when iron is scarce, the time the founder requires the most, a furnace cannot on a moment's notice supply all its customers' demands. Nevertheless those working strictly by analysis in making mixtures of iron, will agree in deprecating the plan of utilizing irons in mixtures that vary widely in their chemical composition. I believe steel men have also found by experience that a great variation in the sulphur and silicon contents of any two or more irons which may be mixed to obtain an average desired, is very objectionable and often injurious to the product.

It is to be understood that this paper in no wise covers the whole question of segregation in cast iron. It is the writer's intention to only call up practical points which confront us all in every-day practice and which he believes will meet the approval of both the furnacemen and founder. The writer would say that as a rule the portion of a casting remaining the longest in a fluid state will contain the greater percentage of the metalloids, unless there is distortion by artificial means, such as "chilling," wet sands and ill-vented or ill-poured molds.

It is not segregation proper that is of greatest importance at the present hour, but rather that the founder know that the chemical analysis of his iron is uniform throughout a shipment, and then have methods to mix the iron ready for charging that will best insure the grade desired in castings. Complaints from the founder are sure to be lessened and a greater trade insured to furnacemen, assisting him to obtain a thoroughly mixed iron, before it reaches the cupola.

THE Garden City Foundry Co., Armitage and Central aves., Station G, Chicago, has succeeded to the business of Turner, Dickinson & Co., Mr. Dickinson having retired. The new company is officered by G. D. Turner, president; J. C. Hoyt, vice-president; Frederick Flynn, treasurer and E. S. Wheeler, secretary. The foundry of the company at Cragin is 208x64 feet, and the machine shop, now at Churchill st. and Hoyen ave., will be removed to Cragin by the first of the year, and will occupy a building 100x64 feet, now in process of construction. Both the foundry and machine shop will be equipped in the most modern way, and will have compressed air hoists. The foundry is heated with hot air, and the machine shop with gas. The company makes a specialty of hangers, pillow blocks, friction clutches and pulleys, and has worked up a large trade in piano plates. Its products are shipped all over the country, hangers having been sent as far east as Maine.

DANIEL GALLAGHER, who was manager of the Western department of T. P. Kelly & Co., New York, for several years and more latterly represented the company in the East, will resume his position as Chicago agent. The company manufactures foundry facings and plumbago, and is well known to the foundry trade of the Central West and the Northwest.

SUPPORT FOR LONG CYLINDRICAL BOILERS.

In its last issue, the *Locomotive* has an article on safe and unsafe methods of supporting long cylindrical boilers, from which we take the following:

"In our September issue we gave some account of the great boiler explosion which occurred at Redcar, Eng., on June 14, 1895, and in the course of the article we attributed the explosion chiefly to the strains produced in the shells of the boilers through faulty methods of support. The support of long cylindrical boilers is a problem of the first importance, and as we have said but little on this subject for some years past, it may be well to touch upon it again. In the first place, it is necessary to understand the trying conditions under which these boilers are run in the rolling mills and iron works in which they most frequently occur. They are run day and night, and there are great and violent changes in the work required of them, with correspondingly sudden variations of pressure. The engines may be running light, for example, and using little or no steam, when suddenly a heavy bloom is seized by the rolls and the machinery comes almost to a standstill—the engine-valves being then wide open, and the draft of steam tremendous. The pressure in the boiler may fall materially while this heavy work is going on, but it will be only a few moments before the rolls are running light again, with the steam preasure up almost to the blowing-off point.

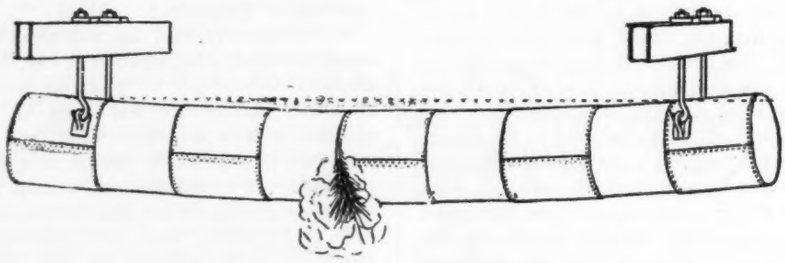
"The extraordinary length of these rolling mill boilers would be quite sufficient to make the problem of support a serious one, even if the work required of them were fairly uniform. They are frequently 50 feet long, and those which exploded at Redcar were no less than 66 feet long. Such boilers, even when exposed merely to the conditions of ordinary service, would be expected to change their shape sensibly under such variations of pressure and temperature as might occur; and in rolling mill practice, where these variations are far greater, the changes of form, and the corresponding variations in the distribution of stress in the shell of the boiler, are far more serious. The long rolling mill boilers are heated by the waste gases from puddling furnaces or blast furnaces and the conditions under which they are run are very variable. At times the combustion chamber under the boilers will be fairly cool—hardly hotter than the boilers themselves—while at other times great sheets of flame sweep along the shell for its entire length.

"Rolling mill boilers have frequently been supported rigidly at three points—one at each end and one in the middle. This might seem to be a proper disposition of the supports, but experience shows it to be faulty and dangerous. The hot gases, striking against the lower shell plates, raise the temperature of the bottom of the boiler so that it becomes sensibly hotter than the top. The bottom of the boiler therefore expands and becomes longer than the top, and the boiler becomes curved in the manner illustrated, on an exaggerated scale, in the cut. The entire load is then thrown on the middle support, and this, unable to carry such a heavy burden, sometimes breaks away, and the boiler falls until the end supports are again taut. The shock so produced, together with the strains already existing in the shell, on account of the pressure, often proves too great to be resisted, and the boiler parts at a girth joint, and great distruction follows. The accompanying cut shows a boiler which is in the act of parting around one of its girth joints, in consequence of the great strain thrown upon the joint by the weight of the boiler and its contents, together with the steam pressure.

"In designing a mode of support that shall be safe and effective, the point to be borne in mind is the necessity of providing for the possible motion of the boiler, under the varying conditions of service. The supports must be strong and substantial, and yet they must not be too rigid and unyielding. It is also necessary to see that the boiler is not bound up tightly in the brick-work; for if it is, fractures are very likely to occur.

"The necessary pliability of the supports may be attained in various ways, and some of the methods that have been proposed are quite elaborate. We shall suggest only two of the simpler modes that have been tried and found to be satisfactory. A plan that has worked well in practice has three supports as before, but the middle one is not rigid, its hangers being attached to a lever which is provided with a weight, proportioned so as to counterbalance the weight of the boiler. To adjust this apparatus properly, the weight of the boiler and its contents must be known. As an example, let us suppose the boiler to be 50 feet long, and 48 inches in diameter. Allowing for laps, rivets, heads, and the contained water, the whole would weigh about 30,000 pounds. The center support would carry half the weight of the boiler, or 15,000 pounds. If the lever be so proportioned that the fulcrum is three inches from the end where the hanger is attached, and 60 inches from the weight, then by the principle of the lever, we have 750 pounds as the weight that must be hung to balance the load that comes on the hanger. Of course, in practice there are two hangers, one on each side of the boiler. In the calculation here given the two are supposed to be secured to the same lever. It is well to make the weight, in sections, so that it can be handled conveniently. The lever should run in guides that are placed outside of the weight and there should be a seat for the end of the lever to rest on when the boiler is empty or not under steam.

"By the other mode of support, referred to above, the weight of the boiler is supported by four pairs of hangers, which are secured to equalizing beams, assumed the boiler



to be 50 feet long. The first support is then five feet from the end of the boiler, and the beam, from the outer hanger to the inner one, is eight feet long. It might be 10 feet long with advantage.

"There are many other ways of supporting long boilers, and in deciding on the adoption of any one of them the important point to bear in mind is whether or not the proposed system has sufficient pliability to allow the boiler to change its size or shape slightly, without interfering with the equal distribution of the load on all of the supports."

The Elliott-Washington Cold Rolled Steel Works, of New Castle, Pa., have decided to enlarge their plant. It will be more than double in capacity and has already been enlarged two times during the last two years. The enlargement will necessitate the removal of the Fleming Bros. Boiler Works, which is on the land adjoining the steel works and that firm will in their new location erect a substantial brick building, 60x60 feet, with iron roof.

COL. A. J. HARTFORD, of New York, inventor of a steel railroad tie, and president of the New York & Chicago Railroad Improvement Co., has been in Cleveland the past two weeks getting some data relative to a proposed plant for the manufacture of steel ties. It is believed more land will be required than can be secured in available sites in Cleveland. At present the company is having ties manufactured under contract for the New York Central Railroad.

THE Pennsylvania Co. has decided to order 2,000 more box cars, which will make the total ordered for all its lines, 7,000 cars in 1895. The new contract has not yet been given out.

Foundrymen's Association.

The regular monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club, Philadelphia, on Wednesday evening, December 4. In the absence of President Schumann, Vice President Wanner occupied the chair.

Secretary Evans read the report of the executive committee as follows: "Our last report stated that a majority of the foundries were busy and prices about the same. The question now to be solved is, how much business are we going to have early in '96, and is pig iron going up or down? We do not think the price of pig is quite as strong as it was, but we understand there is not much stock on the banks, and the demand will of course have its effect. There is no good reason why we should not steadily improve, as there is nothing, not even the question of finances, that should interfere with a prosperous year for 1896. The question of labor troubles was taken up at our last meeting, and discussed at some length, and your committee held a meeting since to decide if a conference was necessary, to go into that question. But as we have not been asked to arbitrate any question there is no reason for holding a conference. This question will be met sooner or later in a way that we hope will be fair to the employer as well as to the employed. The question of convict labor in the penitentiaries of the United States has come up for discussion. The question is, how far this interferes with the outside foundries who are forced to pay a much higer price for labor. We will endeavor to get some statistics on this subject and present them later."

John Seaton, of Atchison, Kan., who is engaged in the manufacture of railroad and architectural castings, was elected to membership in the association.

Dr. J. F. Clement, of Philadelphia, was then introduced and read the following paper on pneumatic tools, exhibiting tools of his own invention and specimens of their work:

The Clement Pneumatic Tools.

Compressed air does not need a champion to support its merits as a saver of laborious processes in the great industries. It has proved its value in many branches of mechanical work, and there only remains an expansion of its usefulness in other fields of labor. Your secretary has asked me to speak this evening upon the application of this power to chipping tools, and especially on the employment of pneumatic tools in foundry work.

There are two devices to which I wish to call your attention that have already proved serviceable in general work where the hand hammer was formerly employed, and for which the experience thus gained would appear to indicate an equally wide field of application in the foundry. One has a valve, and the other is without valves. The former tool has a hammer which is governed by an auxiliary valve, both being air driven and dependent upon the other for its movement. The valve is center draught and consequently has no initial pressure, the air occupying the space between the two center disks at full pressure and escaping from below as the valve moves from side to side, opening and closing its ports. This is an important feature, as the valve seat is prevented from wearing oblong and causing leaks, as occurs where a valve has the initial pressure on one side at all times. Neither the valve nor hammer has any side pressure, therefore they slide easily and freely in their seats, without undue friction. The recoil in such tools would be expected to be considerable and detrimental, and in the older designs such has proved to be the case. In the tool I have described, the recoil is almost wholly removed by a very simple arrangement of the ports. The air above the hammer is brought to a pressure considerably above the initial, and there is obtained the expansion of the air to help drive the hammer on its downward stroke. By this arrangement it is possible to use less air, reduce recoil and gain power, so that lighter tools may be employed. When first brought to the attention of one of the largest users of pneumatic caulking tools in this country, their master mechanic, finding them simple in construction and with fewer parts than in the tool they were using, suggested a competitive trial. Two workmen were given the same kind of work, each using the new tool on alternate days, and the old one on the other day, for a total for each tool of three days. A comparison of the results showed that the new tool had proved its superiority in the quantity of work done to the extent of over 30%.

Tests of their value in chipping were also made. Work was chipped in one half hour that occupied the man who formerly did this chipping by hand 6⅔ hours. In other words, a man chipped by hand one of these pieces and one-half of another in a day of 10 hours or three in two days, while one with the pneumatic tool chipped the piece of work in one-half hour.

Here is a chip 24 inches long and three-sixteenths of an inch thick, that was cut in nine minutes from a three-quarter-inch steel plate. A steel plate was capped in half in 13 hours that would have taken at a low estimate five days to do by hand.

The other tool of which I desire to speak, is termed valveless, or one in which the hammer acts as its own valve. This tool consists of its case and a hammer only, having no throttle or small parts. The hammer has no side pressure, being free to slide easily, and besides acts as its own throttle. When the chisel is in place, a slight pressure starts the tool, while upon relieving the pressure, it stops. This must prove a tool that will stand hard usage and still wear a long time. They are thoroughly case-hardened, so that a file won't touch them, and having no moving parts except the hammer, and that having large bearings, must obviate rapid wear. This is a very fast cutting tool. Its stroke is marvelously rapid and effective, and it should, in the near future, come into use in foundries. Its motion gives one the impression of pushing the sand off rather than a series of blows, and its effective clip must make it able to do the work of many men in chipping off fins, etc. These tools have proved great labor savers in caulking boilers.

I can refer to a case of 24 boilers with plates seven-eighths of an inch thick caulked with one of these tools that were shipped 500 miles and when set and steam turned on not a single leak was found in any one of them. In this case two tools of other makes were tried and found incapable.

In regard to compressed air and its uses in foundries, Mr. Howard A. Pedrick has very fully treated of the subject in an admirable paper read before your association, and very little could be added to what he then said. There is one point, however, that I would like to emphasize. In installing an air plant, provision should be made to have capacity more than sufficient to run all the air tools you contemplate using, as it is almost invariably the case that more are soon found to be advantageous. It is also better to have two or more smaller compressors than one large one, for, as Mr. Pedrick aptly says, around most foundries there are not always available men to repair little tricks to which the average compressor is more or less subject. If something is going to happen to a piece of machinery, I think you will all agree that it is very apt to wait until some time when its need is very urgent for the breaks to occur; therefore if you wish to use air at 80 pounds, one compressor can be set at 81, and the second at 79 pounds, so that when pressure rises to above 79 pounds, the second compressor is cut out, and when it falls below that point, it automatically starts and adds its quantity. This idea can be carried out indefinitely, and be found to be a great saving in power. In the average plant there is a great difference in the amount of air used at various times, and when little is needed, you save the difference between the power needed to run the large compressor and the amount required to run small, with the second ready to bear its part when necessary; and above all you obviate the liability of breaks which might stop your air plant indefinitely.

After the reading of the paper, Mr. Barr, of the Philadelphia Rolling & Machine Works, stated that the tools referred to were being satisfactorily used in his shop for taking off small fins. They were also found to be effective in the removal of sand from large castings, showing a saving of about 35 per cent over hand labor.

The discussion then centered about the relative merits of the pneumatic tools and the sand blast for cleaning castings. William Clark, of the Tacomy Iron & Metal Co., said that his firm had been using the sand-blast for seven months on architectural work, and that as a result there had been a saving in labor of 50 per cent.

Mr. Outerbridge, of the William Sellers Co., reported that in their shop the sand blast had been in use for 10 years. It had been used principally on brass work, however, it being

found that its effect on iron was to produce a somewhat uneven and pitted surface. This he attributed to the fact that iron is harder and offers more resistance than brass. It is a well known fact that the sand blast attacks only hard and resisting materials. Mr. Outerbridge described an interesting experiment which he had made with the sand blast. He had made a very artistic fire screen, by spreading a piece of lace over a sheet of glass about two feet square, and then turned the sand blast upon it. The lace which offered no resistance to the blast remained entirely uninjured, while the interstices were faithfully etched out, leaving upon the glass the beautiful design of the lace-work.

Mr. Devlin said the sand blast was very economical in the handling of castings. Nothing he said, would clean gear wheels better.

Mr. Thos. D. West, who was expected to read a paper on "The Diffusion and Segregation of Metalloids" was not present, but his paper was read by Mr. James Stirling of Wilmington, Del. There was no discussion upon the paper. It is given on another page.

Secretary Evans then read some private letters from iron

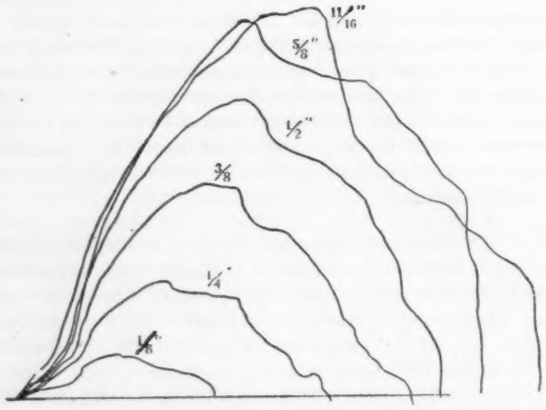


FIG. 5.—RECORDING DEVICE FOR TESTING MACHINE.

founders, who were experiencing or had recently survived labor troubles. Mr. Moore, of S. L. Moore & Sons, shipbuilders, Elizabeth, N. J., whose men are still on strike, was called upon by Secretary Evans to say a few words. He said: "We are still in possession of our property. We have no difficulty in obtaining molders, and have received applications for work from about 200 who are out of employment. We are turning out all the work that we have to do. In reply to the letter of the Iron Molders Board of Conference criticizing our action, I want to say that we are responsible for all that we have said and done. We have done and said nothing that we did not consider right and just. We have been compelled to surrender patterns that would have kept us busy all winter, and the present trouble may end in our becoming a union shop, but not so long as we can help it.

"It is my opinion that the time is ripe for us to form a union of our own, not to embarrass the workingman or to squash his rights, but to protect our own interests. I cannot understand what right any man who sells his labor to me, has

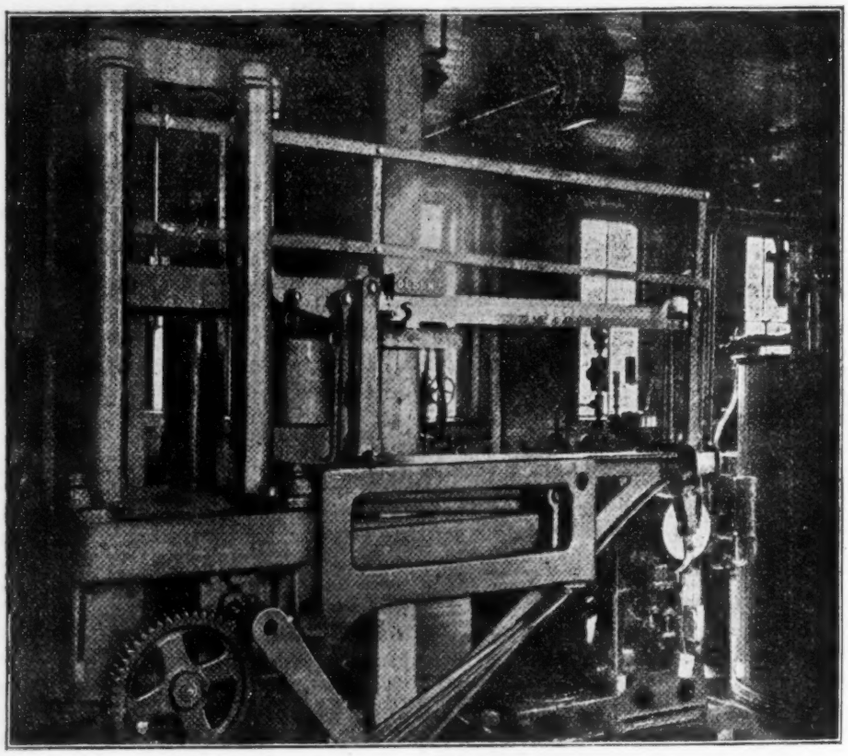


FIG. 3.—RECORDING DEVICE FOR TESTING MACHINE.

to dictate to me, whom I shall employ. We pay good wages. We are now paying our men more than the strikers demanded. When the molders' union says we have made misrepresentations of our case to you, they are not telling the truth. We would like you to investigate.

"If a defense association is deemed necessary, let us organize one and conduct it on pure and just principles. In conclusion I want to say that we will manage our own shop in our own way, or go out of the business.

Mr. Wanner thought that as there was no committee to which questions of this sort might be referred, one should be appointed. He moved the appointment of a committee of four, with the president an *exofficio* member. Mr. Riehle suggested that the secretary be instructed to correspond with the members and obtain expression of opinion as to the organization of a defense association. Mr. Devlin moved to amend by suggesting that a set of principles be first drawn up for presentation to the members.

After some further discussion, Mr. Wanner withdrew his original motion and moved that the matter be referred to the executive committee to report at the next meeting. This motion was carried and the meeting then adjourned.

NOT all, but the fittest, will survive in the contest that has grown so sharp among the publishers of 10-cent magazines. The *Cosmopolitan* has been conspicuous for its excellence, in illustration and in text; and the solution is found in its advertising pages. In the December issue these number 139, which, as the publishers announce, is from $4 000 to $8,000 more net cash advertising than was ever before printed in any magazine. The cost of the artists and authors who appear in this number is divided amongst 400,000 copies, bringing the cost per copy proportionately low.

RECORDING DEVICE FOR TESTING MACHINE.*

BY G. W. BISSELL, AMES, IOWA.

In Figs. 1, 2, and 3, accompanying this paper, are shown views of an autographic recording device attached to a 50,000 pound Olsen testing machine. Fig. 1 shows the instrument

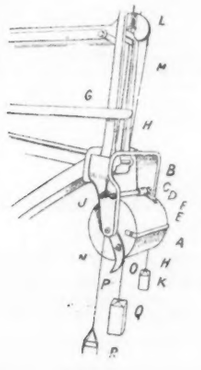


FIG. 1.

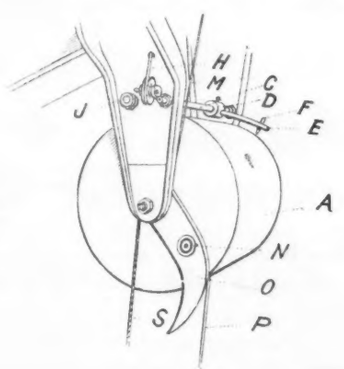


FIG. 2.

arranged for obtaining a record of either a transverse test or a punching test, or any other test in which the movement of the movable head of the testing machine may be taken without gross error as equal to the deformation of the test piece. *A* is a drum about six inches in diameter and seven inches long, hollow, and supported on pivot bearings so as to rotate truly about its geometrical axis. The pivots are supported in the frame *B*, shaped from sheet steel, and bolted to the frame of the testing machine as shown. This frame *B* also serves to support a rod *C*, upon which slides freely the pencil carriage *D*, from which projects the pencil arm *E*, in the end of which is the pencil point *F*. The rod *C* is parallel to the axis of the drum. Consequently the motion of the pencil is parallel to the axis of the drum. The motion of the pencil is obtained from the lever *G*, which is a simple multiplying lever, its ratio of multiplication depending upon the location of a knife edge fulcrum, not shown in Fig. 1, placed between the moving head of the testing machine, and the point of attachment to *G* of the cord *H*, which passes over guide pulley *J* and another guide pulley on the frame *B*, not shown, and provided with a weight *K* to maintain the cord taut. This cord passes through a clamp on the pencil carriage, thus giving to the carriage the motion of the end of the lever *G*. The motion of the drum *A* is obtained from the scale beam *L* of the testing machine, the poise of which is set at zero, by means of a wire *M* fastened to the end of *L* which drops vertically from its point of attachment to *L* and passes around and is fastened to a grooved pulley concentric with the axis of the drum, and rigid in relation to the drum. Secured to the end of the drum by its axis and a thumb screw *N* is a cam *O*, having in its edge a groove to receive a wire *P* carrying a weight *Q*. The shape of this cam is such that the angular motion of the drum is exactly proportional to the motion of the end of the scale beam *L* between its stops, the assumption being made that the leverage of the testing machine is constant during the small arc of vibration of the scale beam. The weight *R* is attached by means of the cord *S* to a small grooved pulley upon the axis of the drum and serves to balance the weight *Q*. The drum *A* is provided with clips for holding the paper, as shown. Although the cam was laid out with very great care, it was deemed best to calibrate the device, and this was done as follows: A piece of wrought iron of such size that it could not be strained beyond its elastic limit by the full power of the testing machine was placed in the testing machine and fitted with micro-electric extensometers as if for taking observations within the elastic limit in a standard tension test. A series of observations of loads and extensions was then taken very carefully, the recording device being attached. A curve plotted from these observations is shown in Fig. 4. Then the recording device was attached, the poise of the machine was set at zero, and the same test piece was again stretched slowly and by such increments as to give as nearly as possible for each such increment a motion of one-quarter inch to the paper on the drum, a pencil being drawn by hand for each such increment, and corresponding micrometer readings being taken. The curve plotted from these observations is shown in Fig. 4; from these two curves a third is easily produced, showing the relation between loads and the ordinates on the paper. The weights *R* and *Q*, in use at present, give a diagram about five inches high for the full capacity of the machine. For lighter work, smaller weights *R* and *Q* could be used to advantage. Fig. 3 shows the method employed in getting autographic records of tension tests. The elongations are multiplied by two as the apparatus is now arranged. A greater degree of magnification necessitates a longer drum. Fig. 5 shows a series of diagrams obtained by putting a three-quarter inch spiral punch through plates of wrought iron, ranging in thickness from one-eighth inch to eleven-sixteenths inch.

*Read at the New York meeting of the American Society of Mechanical Engineers, Dec. 4, 1895.

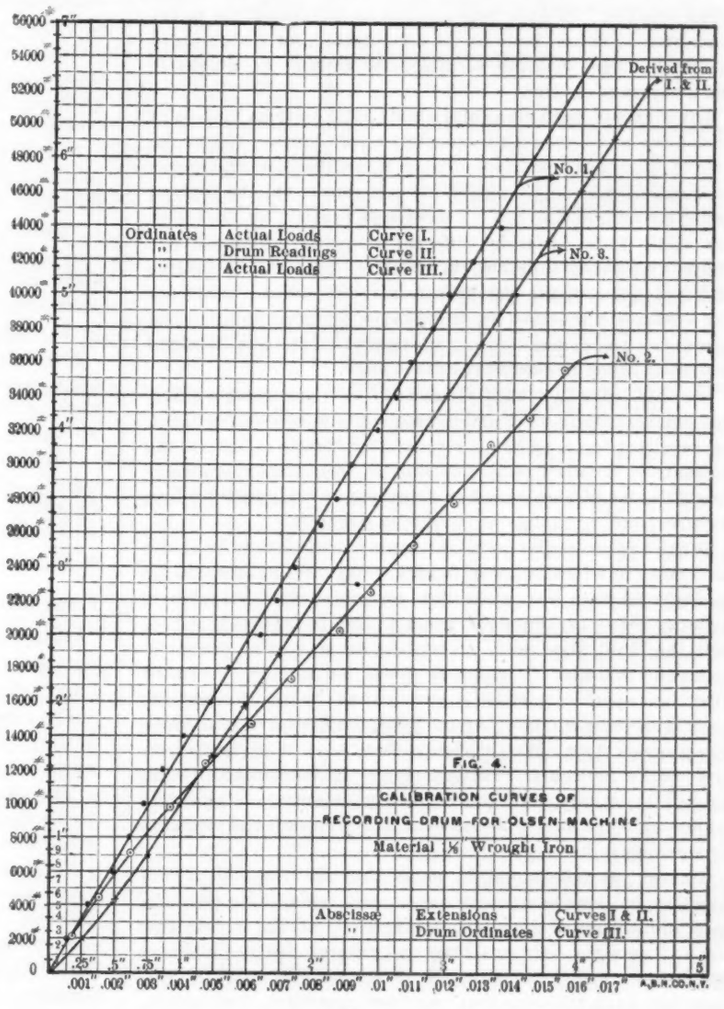

Derived from I. & II.
No. 1.
No. 3.
No. 2.
Ordinates | Actual Loads | Curve I.
" | Drum Readings | Curve II.
" | Actual Loads | Curve III.
FIG. 4.
CALIBRATION CURVES OF
RECORDING DRUM FOR OLSEN MACHINE
Material ⅛ Wrought Iron
Abscissæ | Extensions | Curves I & II.
" | Drum Ordinates | Curve III.

FIG 4

THE Garden City Foundry Co., successor to Turner, Dickinson & Co., is arranging to concentrate its entire business at Cragin, a suburb of Chicago. A building to be 64x100 feet is being erected for a machine shop to finish the castings made in the foundry near by. The company not only handles general foundry and machine work, but has a bronze and nickel plating department and intends to add japanning ovens. Its specialties are hangers, friction clutches and piano plates. At present a portion of the work is done at 76 Churchill st., Chicago, but by Jan. 1 everything will be done at Cragin.

SHRINKAGE OF CAST IRON AND MOLECULAR STRUCTURE.

BY JACOB REESE.

I have been very much interested in the discussion on the expansion and shrinkage of cast iron as reported in *The Iron Trade Review* from time to time, and I think that the Foundrymen's Associations are doing an important and a profitable work in their experiments and discussions in this field of research. I am constrained to write the following on molecular physics, hoping that it may aid in determining the cause of the phenomena under discussion.

A bar of iron is not a continuous body. It may be physically divided. The end of physical division is the molecule. Molecules may be further divided by chemical action. The end of chemical action is the ultimate atom.

Atoms per se are inert. They derive their energy from the physical forces, i. e., the static force, which is inherent in the atoms and tends to draw them together and hold them in a state of rest, and the dynamic force, which accompanies the atoms and tends to push them out into a state of activity. By virtue of these forces the atoms unite and form molecules and the molecules assume a physical structure, in which neither the atoms in the molecules nor the molecules in the physical structure touch each other, nor are they at any time in an absolute state of rest.

When the molecules increase in activity they require more room and when their activity is decreased they are drawn closer together. We are thus enabled to determine the molecular activity of any body by its temperature, for temperature is a phenomenal measure of molecular activity as weight is the measure of matter.

The atoms of each elementary body unite to form molecules in definite numbers called chemical equivalents. The molecule of hydrogen is composed of 2 atoms, carbon 12, oxygen 16, sulphur 32, iron 56, silicon 28, manganese 55; the highest being thorum, having 238. The energy exerted by the inherent static force varies in different elementary bodies. The static force being inherent, its effective force will be inverse to the distance of the particles from each other. Whatever the effective force may be, it is always balanced by an equal amount of the dynamic force; this effective force so balanced is known as the molecular resultant force.

We thus learn that each elementary body possesses a different inherent static force and consequently a different molecular resultant force, and as the molecular resultant force is the measure of tensile strength, it will be seen that every additional degree of an element in a compound body will produce a corresponding change in its tensile strength.

When the molecular resultant force is sufficient to hold the molecules in a local relation to each other the matter will be in the solid state, but when the molecular resultant force is reduced below the force of gravity, the molecules gravitate into the fluid state and become mobile, and when the molecules and the atoms composing them become so distended that their specific gravity is diminished below the specific gravity of their surrounding medium, the matter then assumes the gaseous state. We thus learn that the state of matter, as well as the molecular resultant force, is determined by the molecular activity, and that the molecular activity of any mass of matter is the sum of the molecular activity of the elements composing it.

I have thus endeavored to show that the expansion, contraction and tensile strength are caused by and are phenomenal indications of the molecular activity of the metal; that each elementary body possesses and exerts a distinct inherent static force, a distinct molecular resultant force and its relative degree of activity; that increased activity causes expansion while decreased activity causes contraction, and both of them produce corresponding changes in the tensile strength of the metal.

In the molecule of iron there are 56 atoms and as the atoms are presumed to be of the same shape of the earth, there exists between adjoining atoms what are known as chemical pores. Now if these pores are empty and the specific gravity of the iron be 7.894, if we inject carbon into these chemical pores, while it will increase the molecular resultant force, it will also require room and expand the molecule and thus reduce the specific gravity of the metal, and this appears to explain the fact that steel, though twice as strong, is lighter than iron.

As a matter of interest to your readers, I give the effect of carbon on the specific gravity of iron:

Specific gravity of wrought iron	7.894
" " " steel 0.33 carbon	7.871
" " " " 0.42 "	7.867
" " " " 0.48 "	7.855
" " " " 0.58 "	7.852
" " " " 0.63 "	7.848
" " " " 0.74 "	7.847
" " " " 0.84 "	7.840
" " " " 1.00 "	7.836
" " " " 1.25 "	7.823
" " cast iron 4.52 "	7.204

Philadelphia, Dec. 5, 1895.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

G. H. Palmer and A. D. Bauder, of Hammondsport, N. Y., have formed a partnership for the purpose of carrying on a general machine and repair shop business.

The F. S. Waters Co. has been incorporated at Chicago, with a capital stock of $100,000, to manufacture bicycles. The incorporators are F. S. Waters, B. Waters and F. S. Waters, Jr.

The Goss Printing Press Co., 16th st. and Ashland ave., Chicago, wants to buy a 50 to 60 h. p. engine, in first class condition, and especially adapted for running an electric light plant.

C. Kattendidt, formerly with the American Copper, Brass & Iron Works, of Chicago, has engaged in the tank and boiler business on his own account at 42 and 44 Michigan st., Chicago.

The Elwood Wire & Nail Co. has been incorporated at DeKalb, Ill., to manufacture wire, with a capital stock of $500,000. The incorporators are Isaac L. Elwood, Hiram Elwood and Jason V. Bacon.

A first class second-hand, or new iron planer, that will work about 48″x48″x25′ or 30′ long, with two heads, is wanted. If second-hand, it must be a modern tool with all automatic feeds. Address Lock Box 424, Lowell, Mass.

Jos. Halsted, formerly with the Globe Iron Works, of Chicago, has formed a partnership with his brother, under the name of Halsted Bros., and the new firm has bought the boiler works of Lloyd & Pennington, on West Randolph st., Chicago.

The Toledo Drop Forge Co. has been incorporated at Toledo, O., with $30,000 capital, by J. M. Ashley, Robinson Locke, Charles S. Ashley, M. I. Wilcox and William Sheridan, to manufacture all kinds of iron work used in the construction of bicycles and fittings.

Fires and Accidents:—

Cooper Brothers' machine shop, at Cortland, N. Y., was totally destroyed by fire Nov. 26. It is not known whether the plant will be rebuilt or not.

The rear half of the main building of the Ajax Iron Works, at Corry, Pa., was destroyed by fire on Dec. 1. The loss is about $10,000, covered by insurance.

The stove foundry of J. Woodruff & Sons, Salem, O., was partly destroyed by fire Dec. 6. Patterns and considerable stock were lost. Total loss about $20,000; insured.

The main building of the St. Louis Shovel Co.'s plant was badly damaged by fire and the loss was $80,000 to $100,000; insured. It will be rebuilt at once and of double capacity.

Fire destroyed the 39th street machine shops of the South Side Rapid Transit Co., at Chicago, last week. The loss will amount to $5,000 on the building and $15,000 on the machinery. The building was of frame construction, covered with corrugated iron, and erected on iron pillars at the same height as the elevated road.

Additions, Enlargements, Removals, Etc.:—

The Waltham Mfg. Co., of Waltham, Mass., is putting an addition to its shop, 40x140 feet, for the manufacture of their "Orient" bicycles.

At Joliet, Ill., the Fox Solid Pressed Steel Co. has started extensive improvements. They include a 120-foot extension

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The largest shippers of FIRE BRICK in the West.
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which will increase the output from 100 steel car trucks per day to 150.

The Baker Forge Co., Ellwood City, Pa., will build an addition nearly doubling its capacity. Bolster plates, ring bolts, etc., will be made in the new building.

New Construction:—

The Union Iron & Steel Co., Youngstown, O., will build a steel warehouse, 85x65 feet.

The Schoen Mfg. Co., of Wood's Run, Allegheny, Pa., has bought three acres of land, on which to erect a new plant.

McNab & Harlin, of Paterson, N. J., are to build a new foundry near their present plant. The property has already been purchased.

The Adams & Westlake Co., Chicago, will construct a seven-story factory adjacent to its present plant at Nos. 85 to 93 Ohio street. It will cost $40,000.

Buildings and machinery for the new plant of the Casey & Hedges Mfg. Co., Chattanooga, will cost $20,000. The work will be finished by Feb. 15.

The Berlin Iron Bridge Co., of East Berlin, Conn., has just completed for the United States Projectile Co., at South Brooklyn, N. Y., the steel framework for a new annealing room. The building is 100′ wide and 150′ long, and is designed to be fire-proof.

In the foundry plant under construction at Aurora, Ill., by the American Well Works, improved appliances are being introduced, including a pneumatic system for lifting the flask and drawing the patterns, and for general hoisting purposes. Further improvements, approved by practice are in contemplation, but definite arrangements have not been made.

General Industrial Notes:—

It is reported that the plant of the Columbia Iron & Steel Co., at Uniontown, Pa., will be started up shortly. When the plant was in operation it turned out structural shapes, but it has been idle for more than three years.

The Cranberry Iron & Coal Co., of Cranberry, N. C., will resume operations at once.

The Red Jacket Furnace at New Castle, Pa., has been banked, pending repairs to the hot blasts.

The Elmira Iron & Steel Rolling Mill Co., of Elmira, N. Y., is erecting a plant of two 20-ton basic open hearth furnaces.

Tudor & Gannon, formerly of Indianapolis, have leased the old Filer & Stowell plant at Milwaukee, and will establish a boiler shop.

The Max Meadows Furnace, at Max Meadows, Va., recently leased to the Pulaski Iron Co., has gone in blast. The furnace was rechristened the "Annie Lee."

Of the 112 iron molders who went on strike at the General Electric Lynn Works, nearly two months ago, all but 28 have left the city. The company has filled their positions.

After a steady run of almost a year, the Morton Tin Plate Co., Cambridge, O., announces that its plant will be closed down Dec. 21 for the purpose of taking inventory and making general repairs. Operations will be resumed Dec. 30.

J. A. Fay & Egan Co., Cincinnati, have recently made considerable shipments of machinery to Australia and have taken orders in New Zealand and South Africa. November business was the largest for any month in more than two years.

The Erie & Pittsburg Dock Co. will rebuild its ore docks at Erie, Pa., this winter. It is the intention to put in nine new hoisting engines and a 20 foot channel will be dredged all around the docks. The improvements will cost $100,000.

Dixon's silica graphite paint, manufactured by the Joseph Dixon Crucible Co., of Jersey City, N. J., will be used in painting all the tin work and skylights of the Post office department building at Washington. A quantity will also be used on the Capitol and the District Government building.

The American Fire Brick & Clay Co., Mineral Point, O., is

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1—1½″ Acme Bolt Header.
1—42″ Rotary Planer.
1—55″ Allen Riveter.
1—32″x25 ft. N. H. Engine Lathe.
1—30x30x8 ft. L. D. & Co. Planer.
1—30x30x8 ft. Harrington Planer.

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now shipping fire car loads of brick and clay daily. Among shipments made in one day last week were cars for Hudson, N. Y., and New Brunswick, N. J. The latter shipment is a matter of some satisfaction to the company, going so near the New Jersey clay fields.

Car building: At its West Milwaukee shops the C., M. & St. P. road is having built 1,000 cars of 30 tons capacity each. The Mexican Central will buy 150 box and 50 stock cars. The Lake Erie & Western has completed 50 refrigerator cars at Peru, Ind. The Pullman Co. has received orders for 400 ore cars from the Duluth, Messabe & Northern and for 25 passenger cars from the Metropolitan Elevated.

H. E. Collins & Co., Pittsburg, Pa., sole sales agents for the Cahall vertical water tube boiler, manufactured by the Aultman & Taylor Machinery Co., Mansfield, O., have opened a branch office in the Betz building, Philadelphia, in charge of John H. Pendleton, who will look after the interest of the Cahall boiler in that district. Mr. Pendleton has had a large experience in steam engineering and boiler practice.

The old Rensselaer mill of the Troy Steel & Iron Co., Troy, N. Y., has been purchased for $40,000 by the Ludlow Valve Mfg. Co., of Lansingburg, N. Y., who will take possession July 1, 1896. The building is 100x400 feet in dimensions. Improvements will be made and new structures erected, including a large store house and a pattern room 40x100 feet. The present plant of the valve company at Lansingburg will probably be retained.

The Southwark Foundry & Machine Co., of Philadelphia, has shipped an immense 180,000-lb. fly-wheel, 28 feet in diameter, to the Illinois Steel Co.'s Joliet mill. It will require a 30-inch shaft, and is over four feet across the face. It was transported at the rate of about eight miles an hour on two special cars belonging to the Baldwin Locomotive Works.

The Dunbar Furnace Co.'s improvements at its furnaces at Dunbar, Pa., put the plant in good condition for a steady run. New engines have been put in, the No. 1 furnace relined and other new equipment provided. The 50 Semet-Solvay retort ovens are being rapidly pushed to completion. Pittsburg and Dunbar capitalists, interested in the new coke plant, have in contemplation 200 additional ovens, which will go up after the others are tested.

At New Haven, Conn., Judge W. K. Townsend, in U. S.

district court rendered a decision in the case of the Illinois Steel Co. against the Kilmer Mfg. Co., of New York. The complainant alleged that its appliances for drawing iron rods and wire from blooms with one heat are infringed by the machinery of the defendant. Judge Townsend dismissed the bill, deciding that while the combination of appliances used by the complainant are adequate for a valid patent they are not broad enough to involve those of the defendant.

It was reported last week in a Chicago daily paper that the East Chicago Iron & Steel Co., of Chicago, had been obliged to shut down its mill at East Chicago, Ind., because of its inability to meet its pay roll. This report is untrue in so far as it concerns the cause of the shut-down. The company changed its pay roll day from Monday to Friday, and this caused a misunderstanding among the men, which, however, has been entirely cleared away. The company paid its men in full on Friday of last week. The shut-down was caused partly by a shortage of fuel, and partly because the company has a large stock of material on hand, and takes advantage of this fact to do some repairing. It is expected that the mill will be started again this week and will run on full time. The incorrect report was started by some recently dismissed employees.

A receiver has been applied for the Indiana Steel Co. of Indianapolis, by Wm. D. Kent, Robert Vierling, Louis Vierling, and the South Halsted Street Iron Works, all of Chicago. The Indiana Steel Co., during a brief season of activity, operated under lease the beam mill belonging to the Premier Steel Co. The organization was perfected separately to secure as stockholders a number of large buyers of beams in Chicago and elsewhere. This was done while the beam combination was in existence and the heavy buyers of beams were fighting it; but the disruption of the combination shortly afterward, and the failure of the Premier Steel Co., which followed, put a summary check to their operations. The receivership is asked for to wind up the affairs of the corporation.

LAST ATLANTA EXCURSION.

Special Low Rate via Pennsylvania Lines December 20.

The last special low rate excursion to the Atlanta Exposition has been fixed for Friday, December 20, when tickets will be sold via Pennsylvania Lines based on the exceptional low rate of one cent per mile. Tickets will be good returning 10 days from date of sale. The exposition closes December 31. This will be the last chance to see it. The fare from stations on the Pennsylvania System will be very reasonable, making a delightful holiday trip possible at slight expense. For details, see nearest Pennsylvania Line Ticket Agent, or C. L. Kimball, Ass't Gen'l Pass. Agent, at Cleveland, will furnish information about rates, time of trains, etc.

Clergy Rate Will Remain the Same.

The question of a change in railroad fare charged clergymen has been settled by the managing officers of railways in territory covered by the Central Traffic Association, agreeing to continue to allow a rate of one and one-half cents per mile. For the coming year regularly accredited clergymen, who may be entitled to the same under the rules, can therefore procure reduced rate tickets over the Pennsylvania Lines west of Pittsburg, same as during 1895.

Holiday Excursions via Pennsylvania Lines.

On December 24, 25 and 31, 1895, and January 1, 1896, excursion tickets will be sold from ticket stations on the Pennsylvania Lines west of Pittsburg to points on those lines, valid to return until Jan. 2, 1896. For details, please apply to nearest Pennsylvania Line ticket agent.

The Atlanta Exposition.

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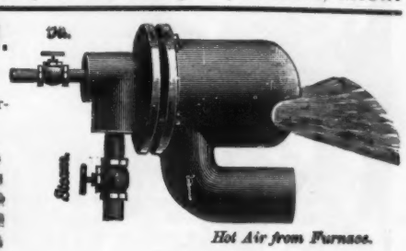

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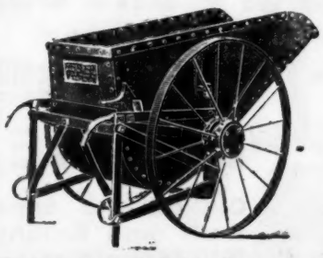

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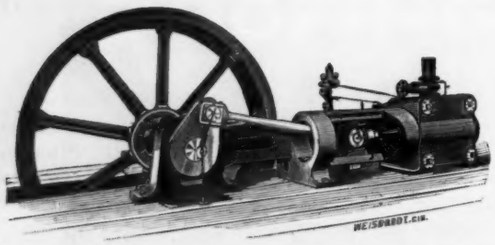

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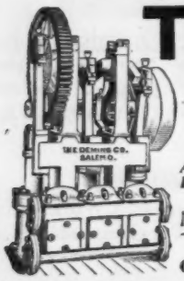

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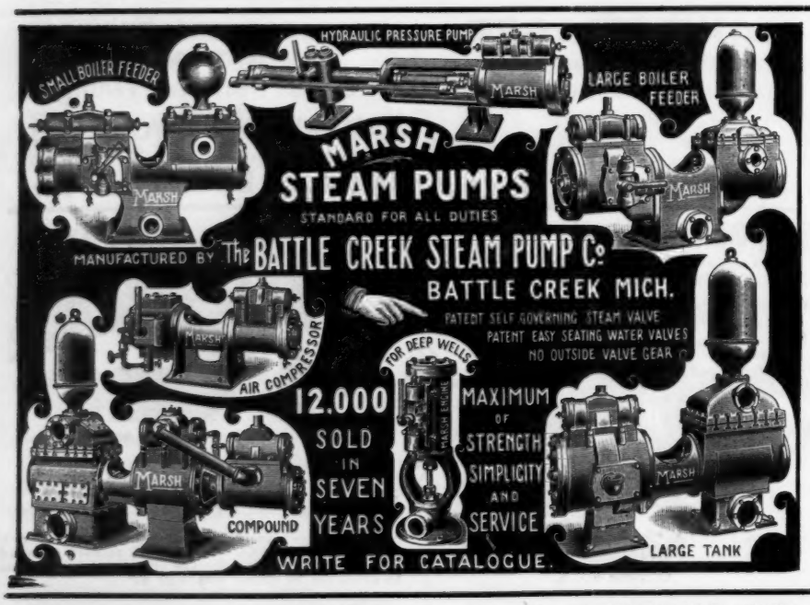

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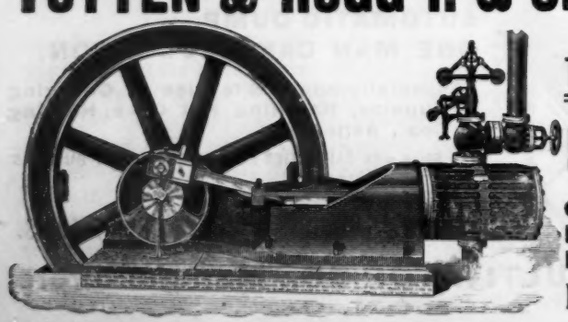

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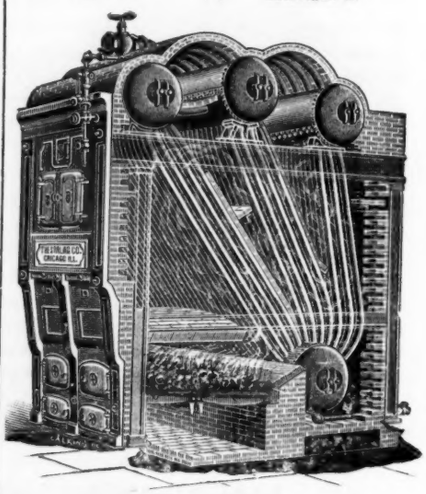

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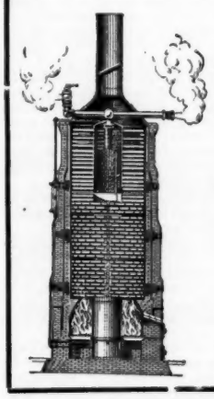

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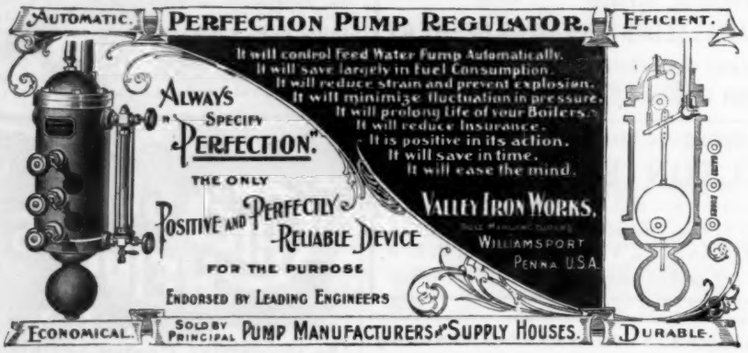
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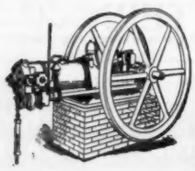

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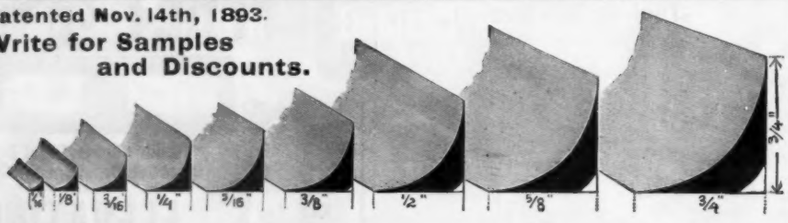

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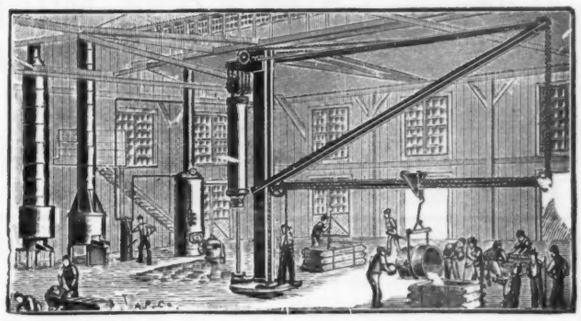

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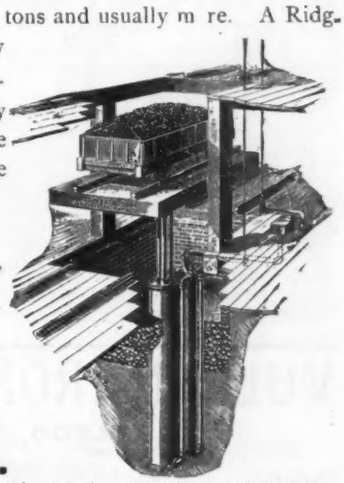

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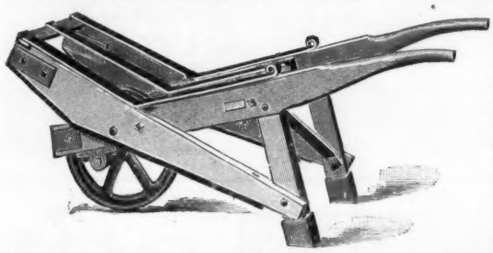

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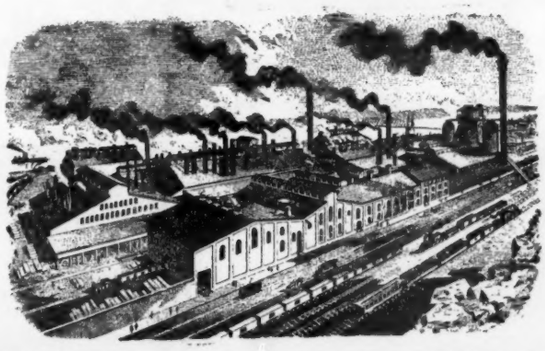

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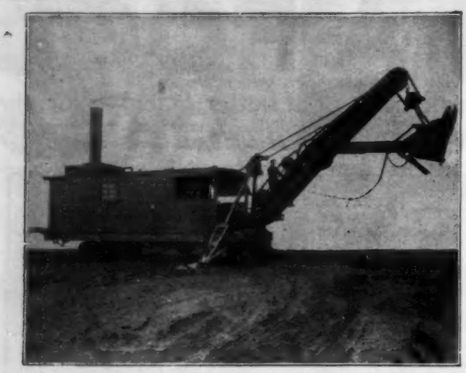

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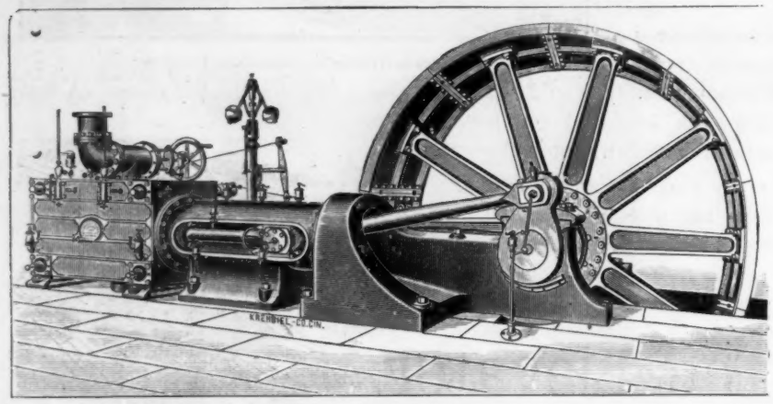

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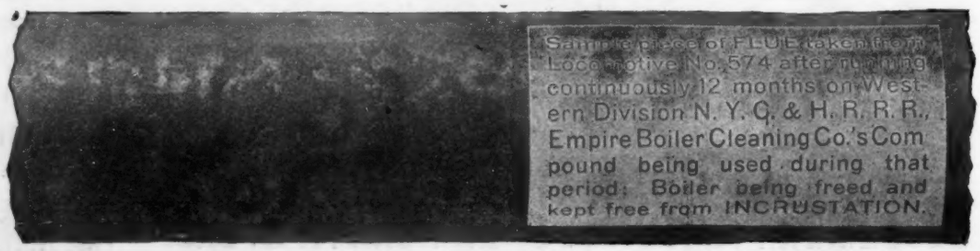
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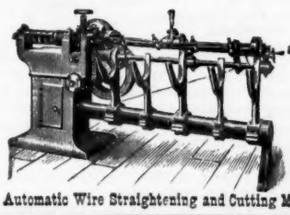

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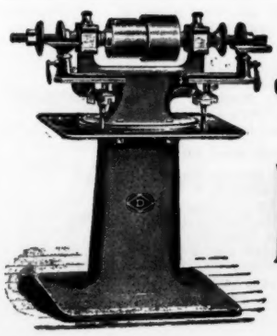

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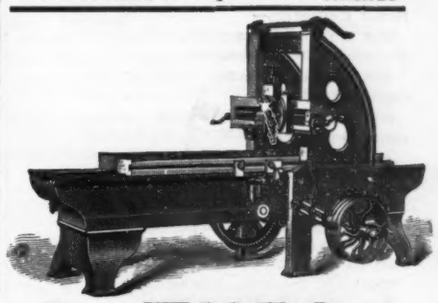

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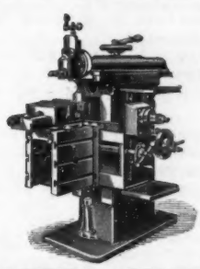

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Blowers—
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Totten & Hogg I. & S. F'dry Co., Pittsburg, Pa.

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C. K. Pittman, Chicago, Ill.
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Corrugated Iron—
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Wm. B. Scaife & Sons, Pittsburg, Pa.

Cranes and Derricks—
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Wm. Tod & Co., Youngstown, O.
American Hoist & Derrick Co., St. Paul, Minn.
Willis Shaw, 416 N. Y. Life Bldg., Chicago.
Craig Ridgway & Son, Coatesville, Pa.
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Shaw Electric Crane Co., Muskegon, Mich.

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American Hoist & Derrick Co., St. Paul, Minn.

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American Hoist & Derrick Co., St. Paul, Minn.
Willis Shaw, 416 N. Y. Life Bldg., Chicago.

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Cady Mfg. Co., Cleveland, O.

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Vulcan Iron Works Co., Toledo, O.

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Hill, Clarke & Co., Chicago, Ill.
Lodge & Shipley Machine Tool Co., Cincinnati.
C. H. Besly & Co., Chicago, Ill.
U. Baird Machinery Co., Pittsburg, Pa.

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Dry Kilns—
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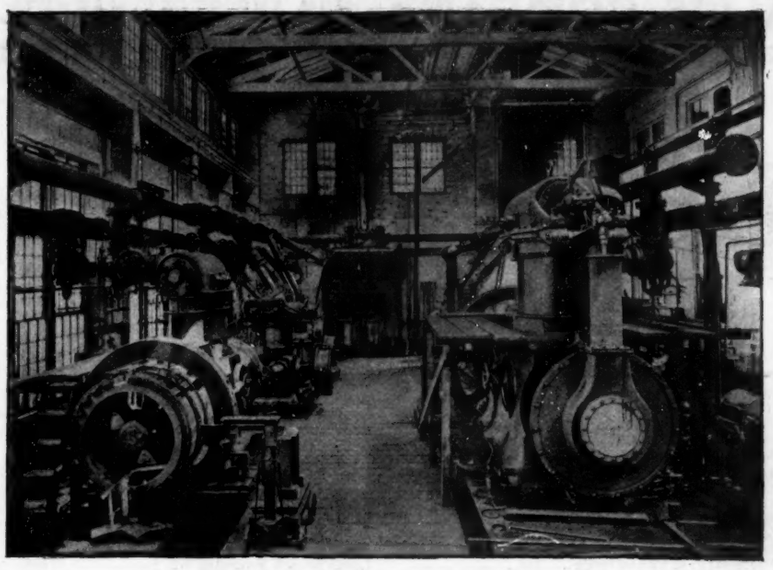

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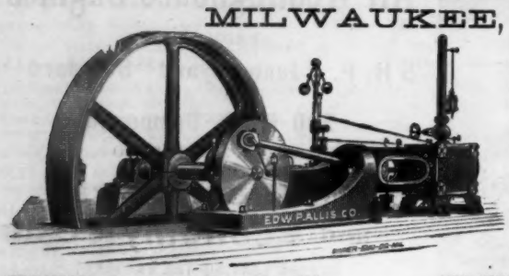

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Link Belt Machinery Co	18
Lloyd Booth Co	30
Long & Allstatter Co	27
*Lodge & Shipley Machine Tool Co	32
Marine Iron Works	16
Marion Steam Shovel Co	31
McDowell Steel Co	32
McNaull & Co	15
Morton Tin Plate Co	16
Moyes, L. M	19
Moore Mfg. & Foundry Co	1
National Engraving Co	20
Newell Bros	1
North American Metaline Co	32
Oak Hill Fire Brick & Coal Co	28
Oglebay, Norton & Co	29
Ohio Sand Co	32
Otto Gas Engine Co	20
Pittman, C. K	2
Pittsburg Steel & Iron Mfg. Co	21
Pollock, Wm. B. & Co	2
Pope, E. C	29
Potter & Hollis Foundry Co	16
Prentiss Tool & Supply Co	23
Q. & C. Co	32
Queen & Crescent & Southern Ry	30
Reese, Hammond & Co	32
Salem Wire Nail Co	20
Scaife & Sons, Wm. B	1
‖Sharon Fire Brick Works	1
Sharpless & Winchell	21
Shaw, Willis	17
†Shaw Electric Crane Co	—
Shiffler Bridge Co	29
Southwark Foundry & Machine Co	19
Starrett Co	1
Sterling Emery Wheel Mfg. Co	30
Stirling Co	18
Stevens, F. B	32
Stilwell-Bierce & Smith-Vaile Co	2
Stowe, Fuller & Co	15
Sturtevant Co., B. F	2
Sykes Iron Roofing Co	20
†Tabor Mfg. Co	—
Taylor & Boggis Foundry Co	1
Thurman Fuel Oil Burner Co	17
Tod, Wm. & Co	30
Toledo Machine & Tool Co	31
Totten & Hogg I. & S. F'dry Co	18
Tretheway & Co	20
Union Electric Co	31
Union Mining Co	15
United States Mailing Co	32
Universal Telephone Co	1
Upson Nut Co	17
Vulcan Iron Works	22
Valley Iron Works	20
†Ward & Nash	—
Westinghouse Machine Co	25
Westmoreland Fire Brick Co	27
†Whiting Foundry Equipment Co	—
Wright Co	23
Zaubitz, August	32

"THE IRON TRADE REVIEW" is an increasingly valuable medium through which to sell equipment to machine shops and foundries.

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The Industrial Centre of Chicago

offers Free Factory Sites and other inducements.

If you are seeking a new location it will pay you well to investigate the merits of our proposition.

Chicago Heights Land Association

M. H. KILGALLEN, Gen'l Mgr. CHICAGO

IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

No. 1 Specular, Bessemer	$4.75@ 5.25
No. 1 Bessemer hematite	4.25@ 4.50
Hematites No. 1 non-Bessemer	2.50@ 3.00
No 1. Specular, non-Bessemer	3.00@ 3.50

PIG IRON.

CLEVELAND (f. o. b. cars):

Bessemer	$12 75@ 13 00
No. 1 Strong Foundry	14 50@ 14 75
No. 2 Strong Foundry	13 75@ 14 00
No. 1 Gray Forge, red short	12 50@ 14 75
No. 2 Gray Forge, neutral	12 25
No. 1 American Scotch	14 75@
No. 2 American Scotch	14 25
Lake Superior Charcoal	15 50@ 16 00

PITTSBURG:

No. 1 Foundry	$14 25@ 14 50
No. 2 Foundry	13 50@ 13 75
Gray Forge	12 25@ 12 50
White and Mottled	12 00@ 12 25
Warm Blast Charcoal	16 00@ 17 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	12 75@ 13 00

CHICAGO (reported by our representative:)

Lake Superior Charcoal	$15 50@$16 00
Local Coke Foundry No. 1	15 00@ 15 50
Local Coke Foundry No. 2	14 50@ 15 00
Local Coke Foundry No. 3	14 00@ 14 50
Local Scotch Foundry No. 1	15 00@ 15 50
Local Scotch Foundry No. 2	14 50@ 15 00
Local Scotch Foundry No. 3	14 00@ 14 50
Southern Coke No. 1	10 70@ 11 00
Southern Coke No. 2	14 00 .....
Southern Coke No. 3	13 65 .....
Southern No. 1 Soft	14 15 .....
Southern No. 2 Soft	13 90 .....
Southern Silveries No. 1	15 00 .....
Southern Silveries No. 2	14 50 .....
Jackson Co. Silveries	15 50@ 16 00
Ohio Silveries No. 1	15 00@ 15 50
Ohio Silveries No. 2	14 50@ 15 00
Ohio Strong Softeners	15 00@ 15 50
Alabama Car Wheel	17 00@ 17 50
Malleable Bessemer	.....
Coke Bessemer	.....

CINCINNATI (reported by Rogers, Brown & Co.)

Southern Coke No. 1, Foundry	$13 00@$ .....
Southern Coke No. 2 and No. 1 Soft	12 75@ 13 00
Hanging Rock Coke, No 1	12 50@ 13 50
Hanging Rock Charcoal No. 1, Fdy	16 00@ 17 00
Tennessee Charcoal No 1	14 00@ 14 50
Jackson County Silvery No 1	14 00@ 15 00
Southern Coke, Gray Forge	12 50 .....
" " Mottled	12 25@ 12 50
Standard Alabama Car Wheel	15 75@ 16 25
Tennessee " "	14 50@ 15 00
Lake Superior " "	16 50@ 17 50

BUFFALO (reported by Rogers, Brown & Co.)

No. 1 Foundry Strong Coke Iron Lake Superior Ore	$14 50 .....
No. 2 Foundry Strong Coke Iron Lake Superior Ore	14 00 .....
Ohio Strong Softener No. 1	16 25@ 16 75
Jackson Co. Silvery No. 1	16 25@ 17 00
Lake Superior Charcoal	16 00
Southern Soft No. 1	15 15@ 15 65
Hanging Rock Charcoal	18 50

ST. LOUIS (reported by Rogers, Brown & Meacham):

Southern Coke No 1	$13 50@$13 75
Southern Coke No. 2	13 25@ 13 50
Southern Coke No. 3	13 00@ 13 25
Southern Gray Forge	13 00@ 13 25
Southern Charcoal No. 1	14 50@ 15 00
Missouri Charcoal No. 1	14 00@ 15 00
Ohio Softeners	16 00@ 17 00
Lake Superior Car Wheel	17 00@ 17 50
Southern Car Wheel	16 50@ 17 00

OLD RAILS AND SCRAP METAL.

	Gross Tons
Old iron rails	$16 50
Old steel rails	13 00
Old car wheels	13 00
	Net Tons
No. 1 R. R. wrought scrap	$12 00
Mill scrap	10 00
No. 1 Machine cast scrap	10 00
Iron axles	17 00
Axle turnings	8 50
Wrought turnings (free from cast)	8 00
Cast borings	7 50
Uncut wrought iron boilers	5 00
Steel boiler plates	11 50
Grate bars	6 50
Pipes and flues (clean)	9 50
Tank iron	9 50
Hoop and band iron	7 00
Sheet iron	7 00
Wrought drillings	8 00
Malleable iron	9 00

STRUCTURAL MATERIAL.

Beams and Channels (Cleveland mill)	1.65c@1.70c
Angles	1.55c@1.60c
Tees	1.70c@1.75c
Universal Plates	1.60c
Sheared Plates	1.70c

MERCHANT IRON AND STEEL.

[List prices out of store.]

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 60
1½ to 6 by ⅜ to 1 inch	1 65
1¾ to 6 by 1⅛ to 2 inch	1 80
1¾ & 1⅜ by ⅜ to ¾ inch	1 65
1 & 1⅛ by ⅜ to ¾ inch	1 70
⅛, ¼, ⅜, by ⅜ to ⅝ inch	1 80

Frank P. Cady, Pres. and Supt.
Geo. H. Bowler, Sec'y and Treas.
THE CADY MFG. CO.
18, 20 and 22 Johnson St., CLEVELAND, O.

SEND FOR OUR NEW CATALOGUE OF Power Presses, Drop Hammers, Punches and Shears, Wire Working and Special Machinery.

PERFORATED METALS
OF ALL KINDS FOR
MILLING MINING AND AGRICULTURAL MACHINERY,
PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC., TO ORDER.
LARGE AND VARIED ASSORTMENT OF SIZES. CORRESPONDENCE SOLICITED.
THE ROBERT AITCHISON. PERFORATED METAL CO.,
OFFICE, ROOM 510 265 TO 269 DEARBORN STREET, CHICAGO, ILL. WORKS SOUTH CHICAGO.

THE
LONG & ALLSTATTER CO.
HAMILTON, OHIO, U. S. A.
Manufacturers of Belt, Steam and Electrically driven
POWER PUNCHES AND SHEARS,
for all kinds of Boiler, Tank and Structural Iron Work, Rolling Mills, Locomotive Shops, Car and Wagon Shops, Plow Shops, etc.
Send for Catalogue. (3)

A. H. LEITCH, PREST. JOHN C. LEITCH, SEC. AND TREAS.
WESTMORELAND FIRE BRICK CO. MANUFACTURERS OF HIGH GRADE FIRE BRICKS.
PITTSBURG, PA.
Works and Mines, Westmoreland, Pa.

DIXON'S GRAPHITE PAINT
FOR TIN OR SHINGLE ROOFS AND IRON WORK. IT IS ABSOLUTELY WITHOUT AN EQUAL. Tin roofs well painted have not required repainting for 10 to 15 years.
If you need any paint it will pay you to send for circular.
JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.

IRON CLAD PAINT CO.
Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g,
CLEVELAND, OHIO.

ORDER DIRECT FROM THE
Iron Clad Paint Co.
And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.
IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.
FURNISHED both Dry and Ground in Oil
USED BY NEARLY ALL THE RAILROADS.

Round and Square.

1 to 1⅜ inch	1 60
2 to 2⅜ inch	1 80
2¾ to 3¼ inch	1 75
3⅜ to 4 inch	2 10
4¼ to 4½ inch	2 70
4¾ to 5 inch	2 90

Oval.

⅜ to 1¼ inch	1 80
⅜ to ¾ inch	1 80
½	2 00
⅜	2 20

Half Oval and Half Round.

1½ to 3 inch	2 15
⅞ to 1½ inch	1 95
⅜ to ¾ inch	2 20
½	2 35
⅜	3 45

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 70
1 to 1⅜ by ¼ and 5-16 inch	1 75
¾ to ⅞ by ¼ and 5-16 inch	1 85
½ to ⅝ by ¼ and 5-16 inch	2 10

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	2 15
1 7-16 to 2, No. 17, 18 and 19	2 20
1 7-16 to 2, No. 20	2 30
1 7-16 to 2, No. 21	2 40
1 7-16 to 2, No. 22	2 50
1⅛ to 1¾, No. 13, 14 and 15	2 20
1⅛ to 1⅜, No. 16, 17 and 18	2 25
1⅛ to 1⅜, No 19 and 20	2 30
1⅛ to 1⅜, No. 21	2 40
1⅛ to 1⅜, No. 22	2 50
15-16 and 1 inch, No. 13, 14 and 15	2 15
15-16 and 1 inch, No. 16, 17 and 18	2 30
15-16 and 1 inch, No. 19 and 20	2 40
15-16 and 1 inch, No. 21	2 50
15-16 and 1 inch, No. 22	2 60
⅞, No. 13, 14 and 15	2 40
⅞, No. 16. 17 and 18	2 50
⅞, No. 19 and 20	2 60
⅞, No. 21	2 70
⅞, No. 22	2 80
13-16, No. 13, 14 and 15	2 50
13-16, No. 16, 17 and 18	2 60
13-16, No. 19 and 20	2 70
13-16, No. 21	2 80
13-16, No. 22	2 90
¾, No. 13, 14 and 15	2 60
¾, No. 16, 17 and 18	2 75
¾, No. 19 and 20	2 85
¾, No. 21	2 95
¾, No. 22	3 05
11-16, No. 13, 14 and 15	2 85
11-16, No. 16, 17 and 18	2 90
11-16, No. 19 and 20	3 00
11-16, No. 21	3 10
11-16, No. 22	3 20
11-16, No. 23	3 30
⅝, No. 13, and 15	2 90
⅝, No. 16, 17 and 18	3 00
⅝, No. 19 and 20	3 10
⅝, No. 21	3 20
⅝, No. 22	3 30
⅝, No. 23	3 40
9-16, No. 13, 14 and 15	3 10
9-16, No. 16, 17 and 18	3 20
9-16, No. and 20	3 30
9-16, No. 21	3 40
9-16, No. 22	3 50
9-16, No. 23	3 60
7-16 and ½ inch, No. 13, 14 and 15	3 30
7-16 and ½ inch, No. 16, 17 and 18	3 40
7-16 and ½ inch, No. 19 and 20	3 50
7-16 and ½ inch, No. 21	3 60
7-16 and ½ inch, No. 22	3 70
7-16 and ½ inch, No. 23	3 80
⅜, No. 13, 14 and 15	3 80
⅜, No. 16, 17 and 18	3 90
⅜, No. 19 and 20	4 00
⅜, No. 21	5 31
⅜, No. 22	4 40
⅜, No. 23	4 55

Light Band.

1½ to 6 by 1/16 to 3-16 inch	1 90
1½ to 6 by Nos. 11 and 12	1 95
1 to 1¾ by 1/16 to 3-16 inch	1 95
1 to 1¾ by Nos. 11 and 12	2 00
⅞ and 13-16 by 1/16 to 3-16 inch	2 10
⅞ and 13-16 by Nos. 11 and 12	2 15
¾ and 11-16 by 1/16 to 3-16 inch	2 20
¾ and 11-16 by Nos. 11 and 12	2 25
⅝ and 9-16 by 1/16 to 3-16 inch	2 35
⅝ and 9-16 by Nos. 11 and 12	2 40
½ by 1/16 to 3-16 inch	2 50
½ by Nos. 11 and 12	2 55

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	2 10
⅞ inch, " " " " 13 and 14	2 20
¾ inch, " " " " 11 and 12	2 25
¾ inch, " " " " 13 and 14	1 55

Sheet Iron.

No. 10	2 10
No. 12	2 20
No. 14	2 25
No. 15-17	2 35
No. 18	2 50
No. 20	2 65
No. 22-24	2 75
No. 25.26	2 85
No. 27	2 95

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 00
Shell	2 15
Flange	2 25
Marine Flange	2 60
Fire Box	3 70

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	08
9-16 to ½ in. "	08

ÆTNA-STANDARD IRON AND STEEL COMPANY,

BRIDGEPORT, OHIO,

MANUFACTURERS OF

TIN AND TERNE PLATE, Iron and Ste Plates and Sheets, Plain Black, Painted, Corrugated and other forms of ROOFING, SIDING and CEILING. Patent Leveled Galvanized Sheets, BARS, Light Section Rails, ANGLES, Tees, Channels, and other Miscellaneous Bars and SHAPES.

WITH SUCH DIVERSITY OF PRODUCT,

SPECIAL ADVANTAGES are offered buyers of mixed lots, effecting saving in freight charges and by reason of our LARGE STOCKS, securing **PROMPT SHIPMENT.**

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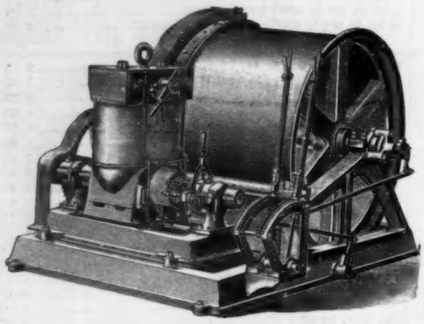

HOISTING MACHINERY for Mining, Quarrying, Coal Handling, Pile Driving, Bridge Building, Log Hauling and for general Contractors' Use. Improved Electric Hoists, single and double Patent Friction Drum, compound, geared with brakes and reversible for general Hoisting, Mining Purposes and Suspension Cable Ways.

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POCAHONTAS FLAT-TOP COKE.

So low in ash that it requires no fluxing for foundry purposes. Our foundry and furnace coke was awarded the first premium at the World's Fair in 1893.

AVERAGE ANALYSIS OF COKE.

Moisture	00.196	Sulphur	00.677
Fixed Carbon	93.625	Ash	05 004
Volatile Matter	00.494		

Foundry, Furnace and all sizes of crushed coke. Guaranteed lower in Sulphur than any other commercial coke

STEEL CASTINGS

OF EVERY DESCRIPTION

Made from Best Open-Hearth Steel.

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Compare the analysis of the clay used in our.....

"O.K." CROWN

High Grade Fire Brick, with that used by **ANY** other Fire Brick-maker, and you will understand why, they have stood the **TEST** for **TWENTY-TWO LONG YEARS**

Our Prices are Just ...Right...

OAK HILL FIRE BRICK AND COAL CO.

MANUFACTURERS

OAK HILL, OHIO

7-16 to ⅝ and 2¾ to 3 in.	.09
3¾ to 4 in.	.09½
⅝ to 11-16 and 4¾	.10
⅝ to 6 in.	.10½
¾ to 9-32 and 6¾ to 7 in.	.11
7 in	.13

Flats.

	cts. lbs
2 to 9-16 in. wide by 2 to ⅝ thick	.8

Bessemer and O. H. Steel.

Bessemer Machinery	base price,	1 50
Open-hearth Tire	"	1 80
Open-hearth Spring	"	2 20
Sleigh Shoe	"	1 90
Toe Calk	"	2 10
Cutter Shoes, tapered and bent	"	2 20

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 30
Bridge ½, ⅝, 11-16 and ¾ inch diam	3 00

Wrought Pipe and Boiler Tubes.

Lap weld black, base	dis. 65
Butt " " "	dis. 55
Lap " galv. "	dis. 50½
Butt " " "	dis. 50
Boiler tubes 2½" and smaller	dis 60½
Boiler tubes 2½" and larger	dis. 65
Casing screw and socket joint	dis. 52½
Casing inserted joint	dis. 47½

MACHINERY SUPPLY MARKET.

Anvils.

American	₩ lb 9@10
Wright's	₩ lb 12

Bellows.

Blacksmiths'	Hill's	dis 40
	Bullock's	dis 50&10
Moulders'		dis 40@40&10
Hand		dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 4(
Standard, oak tanned	dis 50&1(
Alexander Brothers' pure oak tanned	dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis
Horton's Universal	dis
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis
" " Gear Cutters	dis

Crowbars.

Cast Steel	₩ 3½
Iron, steel points	₩ lb 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1⅛"	dis 50&10
Morse Taper and Straight Shank Larger than 1⅛"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

SHIFFLER BRIDGE COMPANY,

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SPECIALTIES: STEEL AND IRON BUILDINGS FOR ROLLING-MILLS TIN PLATE PLANTS, STEEL WORKS, FOUNDRIES, FACTORIES, ROOF TRUSSES, GIRDERS, COLUMNS, BEAMS, CORRUGATED IRON, ETC.

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65 Dexter Building, Chicago, Ill.
228 Lumber Exchange, Minneapolis, Minn.

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ONE THOUSAND MILES OF LAKE RIDE AT SMALL EXPENSE.

Visit this Historical Island, which is the grandest summer resort on the Great Lakes. It only costs about $13 from Detroit; $15 from Toledo; $18 from Cleveland, for the round trip, including meals and berths. Avoid the heat and dust by traveling on the D. & C. floating palaces. The attractions of a trip to the Mackinac region are unsurpassed. The island itself is a grand romantic spot, its climate most invigorating. Two new steel passenger steamers have just been built for the upper lake route, costing $300,000 each. They are equipped with every modern convenience, annunciators bath rooms, etc., illuminated throughout by electricity, and are guaranteed to be the grandest, largest and safest steamers on fresh water. These steamers favorably compare with the great ocean liners in construction and speed. Four trips per week between Toledo, Detroit, Alpena, Mackinac, St. Ignace, Petoskey, Chicago, "Soo," Marquette and Duluth. Daily between Cleveland and Detroit, and Cleveland and Put-in-Bay. The palatial equipment makes traveling on these steamers thoroughly enjoyable. Send for illustrated descriptive pamphlet. Address A. A. SCHANTZ, G. P. A., D. & C., Detroit, Mich.

Cleveland Union Station.

Pennsylvania Lines.

Foot of Bank Street.

TICKET OFFICES at Station, Euclid Av., Woodland Av., and Weddell House corner.

THROUGH TRAINS RUN AS FOLLOWS BY CENTRAL TIME
* Daily. † Daily, except Sunday.

FROM CLEVELAND TO	LEAVE	ARRIVE
Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	†12:45 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	† 3:25 pm	† 9:50 am
Hudson and Ravenna	* 5:00 pm	* 8:25 am
Philadelphia and New York	*11:10 pm	* 5:25 am
Baltimore and Washington	*11:10 pm	* 5:25 am
Alliance and Pittsburgh	*11:10 pm	* 5:25 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:40 am	* 5:15 pm
Akron and Columbus	* 8:40 am	*5:15 pm
Akron, Columbus & Zanesville	†12:45 pm	†12:10 pm
Akron and Orrville	† 3:25 pm	† 9.50 am
Columbus and Cincinnati	* 8:00 pm	* 6:55 am

The Cleveland Terminal & Valley R. R. Co.

Depot foot of So. Water St.
City Office 137 Superior St.

	Arrive.	Depart.
Valley Jctn. & Way Stations	*6:30 P M	*7:10 A M
Akron, Canton & Valley	*10:10 A M	*3:15 P M
Akron, Canton & Chicago	*8:10 A M	*6:30 P M
Akron, Canton & Wooster, Defiance, Garrett, Marietta, Wheeling, Washington, D. C., and Baltimore	†2:55 P M	†11:00 A M

†Daily except Sunday. *Daily. Pullman's Palace Vestibule sleeping cars between Cleveland and Chicago.

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STEAM TUBE WELDING WORKS.

Manufacturers of reworked boiler tubes
Good second-hand tubes bought.

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THE CONDIT-FULLER CO.,

Pig and Bar Iron,

CLEVELAND, . OHIO.

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COMMISSION DEALER IN

Iron Ore, Pig Iron AND METALS.

Cleveland - Ohio.

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PETER GERLACH & CO.,

MAKERS OF

Saws, Tools and Machinery.

Office and Warerooms, 28 Columbus St.
Factories on Columbus, Winter and Leonard Sts.,
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LAKE SUPERIOR IRON ORES.

— AGENTS —

The Spanish-American Iron Co.,
Santiago, Cuba.
CLEVELAND. PHILADELPHIA.

$2.50 CLEVELAND TO BUFFALO

Via "C. & B. LINE,"

Commencing with opening of navigation (about April 1st). Magnificent side-wheel steel steamers
"State of Ohio" and "State of New York."

DAILY TIME TABLE.

SUNDAY INCLUDED.

Lv. Cleveland, 6:00 P.M. | Lv. Buffalo, 6:30 P.M.
Ar. Buffalo, 7:30 A.M. | Ar. Cleveland, 7:30 A.M.

CENTRAL STANDARD TIME.

Take the "C. & B. Line" steamers and enjoy a refreshing night's rest when enroute to **Buffalo, Niagara Falls, Toronto, New York Boston, Albany, 1,000 Islands,** or any Eastern or Canadian point.

Cheap Excursions Weekly to Niagara Falls.

Send 4 cents postage for tourist pamphlet.

W. F. HERMAN, Gen'l Pass. Agt. **T. F. NEWMAN,** Gen'l Manager.
Cleveland, O.

Holiday Excursions!

Christmas, 1895.
New Year, 1896.

BIG FOUR ROUTE

ONE AND ONE-THIRD FARE

ROUND TRIP

Tickets will be sold between all points on the Big Four Route, good going December 24, 25 and 31, 1895, and January 1, 1896, good returning until January 2, 1896, inclusive.

E. O. McCORMICK, Pass. Traffic Mgr. **D. B. MARTIN,** Gen. Pass. & Ticket Agt.

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F.	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70
Western	dis 70
Stub's	dis 25
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 50
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	12c
" " " " over 5 lbs	10c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¾	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¾	4	3¾	3⅛
Hexagon	15¾	11½	8½	6	5¾	5¼	
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887	dis 85
Standard Penny Nails, ₩ keg card rate	
Car lots	$2.30
Less than car lots	$2.50

Oilers.

Zinc and Tin	dis 60
Brass and Copper	dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz	dis 10@10&10

Picks.

Railroads, 5 to 6 lbs	$12 dis 60
" 6 to 7 lbs	$13 dis 60

Pulleys.

Iron Pulleys, Walker List	dis 50
Medart Pulleys	dis 50
Split Wood Pulleys	dis 55@60

Pulley Blocks.

Moore's Anti-Friction Differential Chain Pulley Block	dis 20

Rivets.

Iron, Thousand, list November 1, 1894	dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894	dis 60@65
Copper	dis 50@50&10

Taps.

Cards, Hand and Nut to 2 in	dis 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

Wire.

New List, Apr. 9, 1894

Brass	dis 4c
Copper	dis 4c
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65& 5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	95c ₩ lb dis 30

Wrenches.

Coe's genuine	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanic's	dis 55&10& 5
Bemis & Call's Combination	dis 35
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 25
William's " "	dis 25
Alligator " "	dis 40

Emery.

	No. 4 to No. 54 to Flour, C. F		
	46 gr.	150 gr.	F. FF.
Kegs, ₩ lb	4½c	5 c	2½c
½ kegs ₩ lb	4¾c	5¼c	2¾c
¼ kegs ₩ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	5 c
10 lb cans less than 10	10 c	10 c	7½c

Emery Cloth and Paper.

Barder, Adamson & Co	dis 50@50&5
H. H. Barton	dis 50@50&5

Emery Wheels.

Detroit	dis 60@70
Norton's	dis 60@70
Grant	dis 60@70
Sterling	dis 60@70
Celluloid	dis 10&33½
Northampton	dis 55
Crystal	dis 65@70
Vitrified	dis 60@70
Vulcanite	dis 60&10
Hamden	dis 60&10@70
Cyclone	dis 60@60&10

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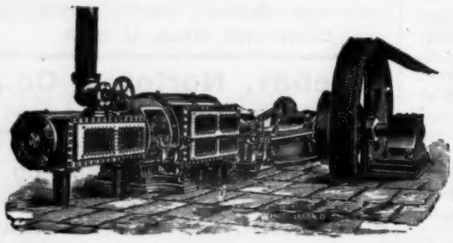

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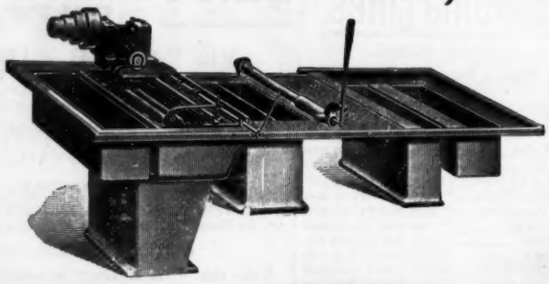

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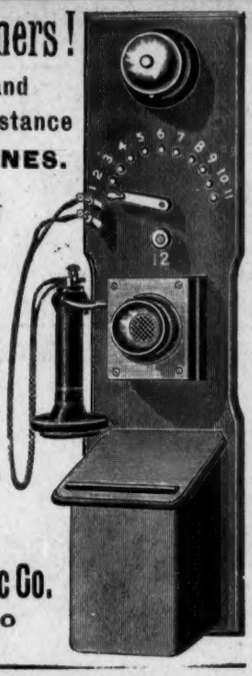

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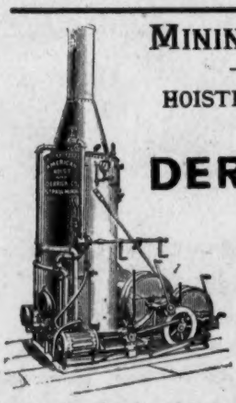

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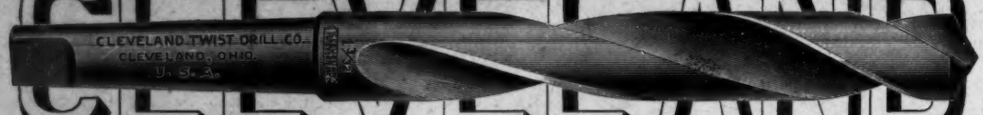

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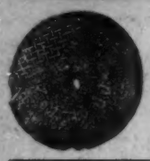

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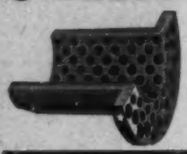

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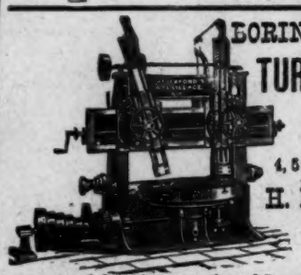

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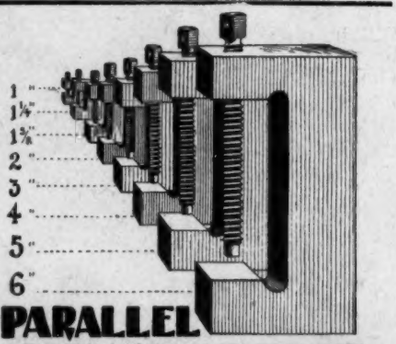

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